JUN 16 1922

CANADIAN MACHINERY
AND MANUFACTURING NEWS

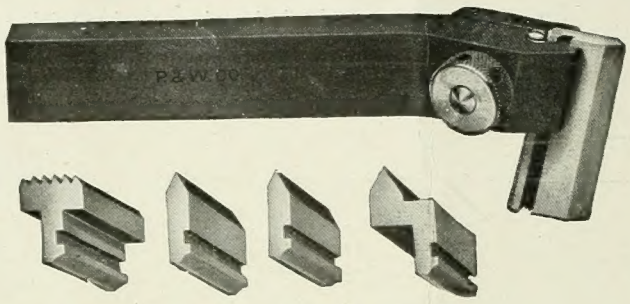
RE-ESTABLISHMENT AND INDUSTRIAL EXPANSION NUMBER

Vol. XXII. No. 5 Publication Office: Toronto, July 31, 1919 Subscription Price $3.00 Per Year

BERTRAM
MACHINE TOOLS
JB&SCO
Equipment for Structural and Shipbuilding Plants, Punches, Shears Coping Machines Rotary Planers Straightening and Bending Machines Bulldozers
THE JOHN BERTRAM & SONS CO., LIMITED
DUNDAS, ONTARIO, CANADA.

SMALL TOOLS

P. & W. Threading Tools



Chaser | Single Point | Offset | Double Onset

PROMPT SERVICE

is assured at our nearest office. Place your order there to-day.

Uses the same holder for chasers and single point cutters. The change can be made in a jiffy.

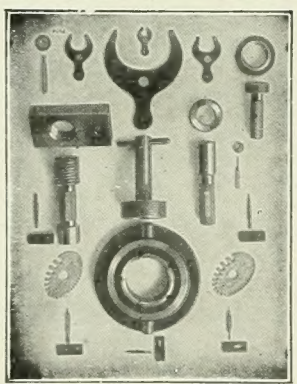
A few of its advantages:

Threads can be cut very close to shoulder.

Tools are sharpened by simply grinding off top of cutter.

Combines economy with all features essential in a threading and forming tool.

Cutters have 15 deg. clearance, which experience has taught gives the longest wear in various metals.



PRATT & WHITNEY
Standards and Gauges
Accuracy Unequalled

Precision Machine Tools

PRATT & WHITNEY CO.

OF CANADA, LIMITED

Works: Dundas, Ontario

MONTREAL	TORONTO	WINNIPEG	HALIFAX	VANCOUVER
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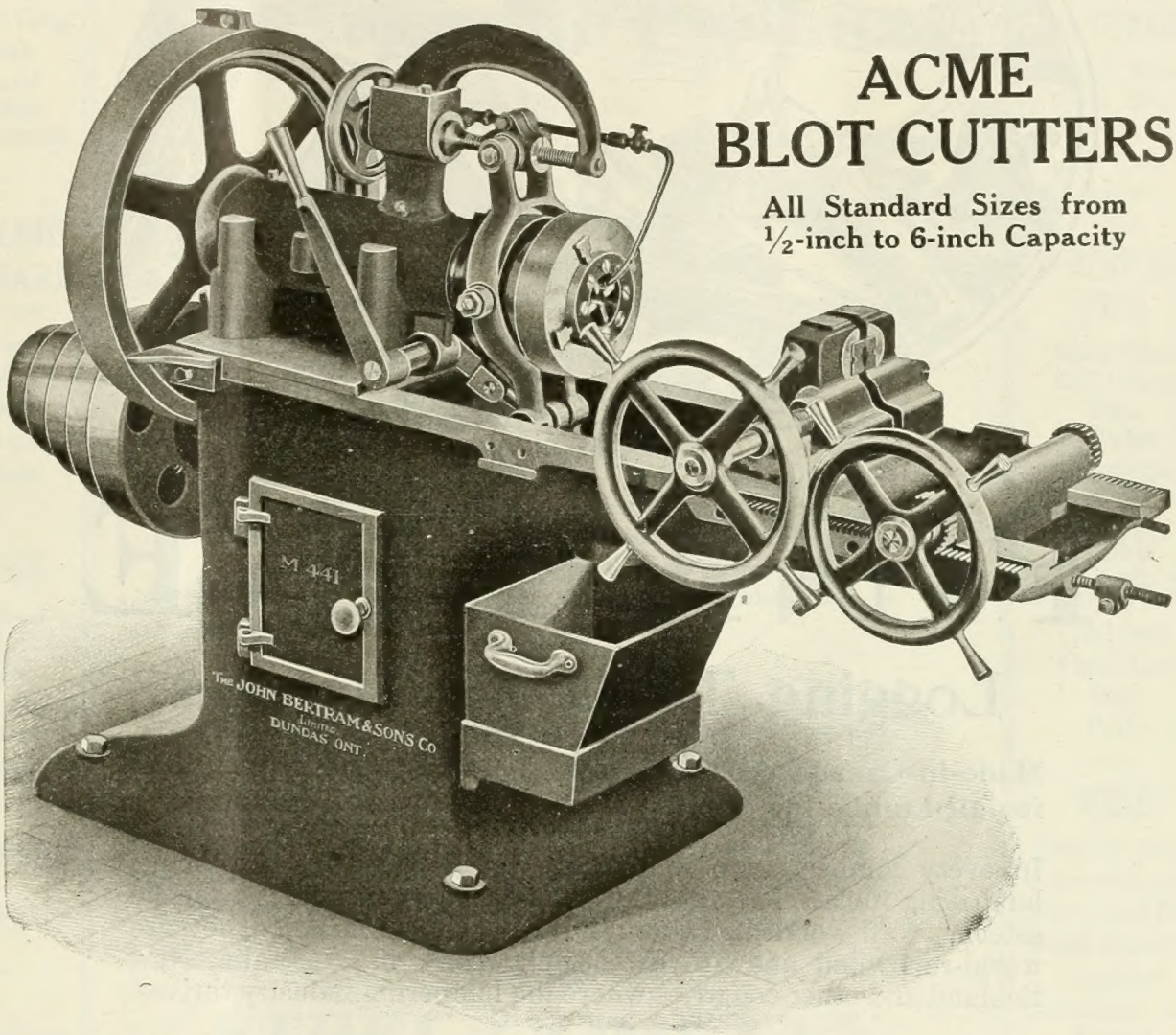
BERTRAM MACHINE TOOLS

ACME BLOT CUTTERS

All Standard Sizes from
½-inch to 6-inch Capacity



Supplied with Leadscrew Attachment for Stay Bolts or other work requiring special Accuracy of Pitch.

WRITE US FOR FULL DETAILS ON ANY MACHINE
OR MACHINES IN WHICH YOU ARE INTERESTED

The John Bertram & Sons Company Limited

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PINK LINE

Logging Tools and Handles

Made-in-Canada products—headquarters for British Empire for all Lumbering Tools.

In every lumber camp in Canada you'll find PINK'S famous lumbering tools. They are the favorites there and have won the esteem of all woodsmen through their superior merit. They are world-renowned and are extensively used in Australia, New Zealand and other countries where the lumbering industry thrives.

EXPORTS TO EUROPE

We ship to Britain and her Allies the same good quality of lumbering tools that have made *Pink's tools* a by-word in the matter of good tools in all Canadian lumber camps. Enquiries cordially solicited.

ALSO MAKERS OF CAR MOVERS

Sold throughout Canada by all wholesale and retail hardware merchants.
Long Distance Phone No. 87.

The Thomas Pink Co., Limited

Pembroke, Ontario, Canada

BY-PRODUCT COKE
SULPHATE of AMMONIA

"HAMILTON" PIG IRON
Basic Malleable Foundry

STEEL & IRON BARS
OPEN HEARTH STEEL SHEETS

FORGINGS
Car Axles
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POLE LINE HARDWARE
(Black and Galvanized)
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Steel, Brass and Bronze
Wood and Machine Screws

NAILS, SPIKES & RIVETS
Wire
Cut
Boat and Horse Shoe Nails
Railway
Pressed and Drift Spikes
Tacks
Shoe Nails
Steel and Copper Rivets
Burrs

Purchase the Products of Canadian Mills

TO uphold the Glory we have jointly earned—to honor our noble dead—to comfort the wounded, and extend to the men returned the hand of prosperous welcome, we must cast aside all forebodings and face the future with unbounded courage and confidence and, without a shadow of doubt, declare to the World that this Nation, which was so quickly and successfully transformed to a War basis, can be depended upon to revert to Peace conditions with equal success. The buyer and seller must recognize their duty to the Nation and co-operate fully to the end that all products that can be produced in Canada by Canadian workmen shall not be purchased elsewhere.

OUR Duty is plain; Canada with Canadian labor and capital can produce, manufacture and distribute products sufficient to keep the wheels of industry turning to the limit. The song of Prosperity and Happiness should ring out all over the land. Let us sincerely pledge to the extent of our needs, to purchase materials produced in Canada by Canadian Workmen, and the result of our efforts will return to us the Blessings of a Prosperous and Happy Nation.

THE
STEEL COMPANY
OF
CANADA
LIMITED
HAMILTON MONTREAL

RAILROAD TRACK MATERIAL
Angle Bars
Track Bolts
Tie Plates
Tie Rods
Spikes

WROUGHT PIPE
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LEAD PRODUCTS
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ALGOMA STEEL CORPORATION, LTD.

MARK OF ALGOMA O.H. QUALITY

SAULT STE. MARIE
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STEEL RAILS
Open Hearth Quality
(All Sections from 12 lbs to 100 lbs per yard)

SPLICE BARS

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PIG IRON
BASIC, FOUNDRY-
BESSEMER

SULPHATE OF AMMONIA

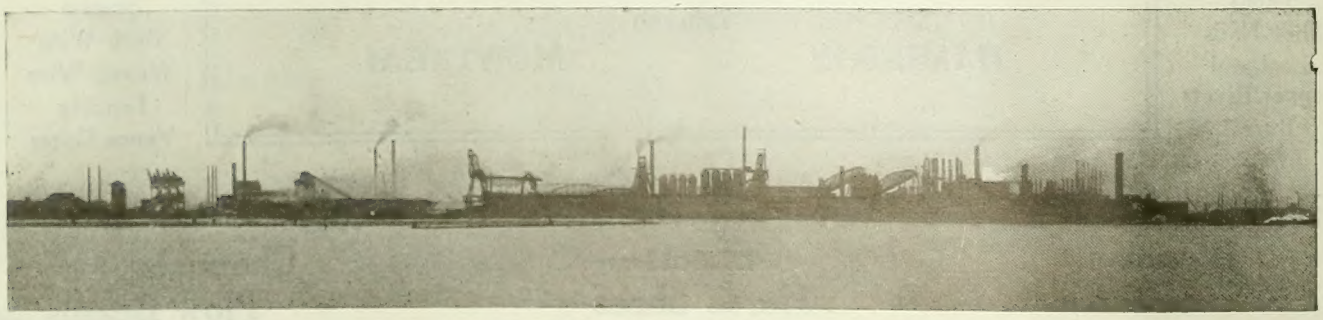
BLOOMS,
BILLETS,
SLABS,
STRUCTURAL STEEL

MERCHANT BARS

CONCRETE REINFORCING BARS

IRON, BRASS AND BRONZE CASTINGS

Sulphuric Acid. Nitre Cake.



General View of the Plant of the Algoma Steel Corporation from the Waterfront.

Five Betts Planers in this Ohio Plant

BETTS tools are built to render service—not to sell at a price. The Ohio Locomotive Works, in which this photo above was taken, investigated the entire machine tool field before purchasing 5 Betts Planers. After a point for point comparison they found Betts tools to be the best investment.

They have had good reason to congratulate themselves many times on their judgment as the five machines are giving satisfactory service and the production obtained more than meets the rigid requirements of this plant—not only on the class of work shown here, but on every kind of a job that can be handled on a planer.

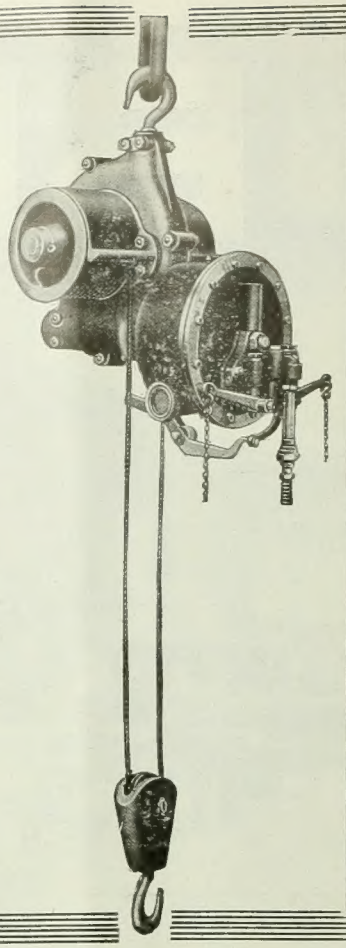
When you think of machine tools---think of Betts

Betts Machine Company

408 Blossom Road, Rochester, N. Y.

Less Overhead Expense

Whenever a strong, dependable hoist is needed, the "Imperial" air motor hoist fills the bill.



Few Parts Mean Less Trouble
The "Imperial" has few parts

The motor is completely balanced; the sensitive control allows the load to be raised or lowered a fraction of an inch at a time. Ball and roller bearings and thorough lubrication insure long wear.

Bulletin 8006 will interest you.

Canadian Ingersoll-Rand Company Limited

Sydney Sherbrooke Montreal Toronto Cobalt
Winnipeg Nelson Vancouver

Swedish Steel & Importing Co., Limited

Montreal New York Toronto Denver

Direct representatives of foremost Swedish mills; makers of

Tool Steels

ALLOY STEELS, BILLETS, BARS, DISCS, SHEETS, HIGH SPEED STEELS, DRILL RODS, DRAWN BARS, SEAMLESS TUBING, COLD ROLLED STRIP STEEL, WELDING WIRE, WROUGHT AND ROLLED IRON, PIG IRON, STEEL AND IRON ENDS, HOLLOW AND SOLID MINING DRILL STEEL.

TRADE MARK SS "DOUBLE ESS"

PROMPT SHIPMENTS from large stock

WOLFRAM

MADE IN THE U.S.A.

HIGH SPEED STEEL TRADE MARK

A Keen Cutter

WOLFRAM *Is Both*

Strong in the Neck

VULCAN CRUCIBLE STEEL CO. Aliquippa ESTABLISHED 1900 Pa: U.S.A.

Represented in Canada by Messrs Norlon Callard & Company MONTREAL QUE.

WILT

Machine shop foremen and superintendents who invariably specify **"WILT"** when requisitioning tools know **WILT Drills, Reamers and Milling Cutters** are superior—are absolutely guaranteed against defective material and workmanship—are rigidly inspected before being shipped. To produce more, use **WILT Drills.** To produce more economically, use **WILT Drills, Reamers and Milling Cutters.** Elimination of breakage alone will save you much.

HIGH SPEED AND CARBON TWIST DRILLS

WILT TWIST DRILL CO. OF CANADA, LIMITED

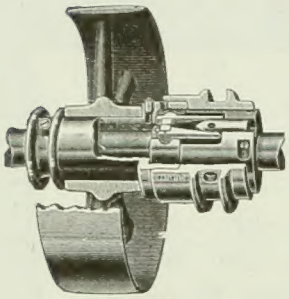
Walkerville, Ontario.

London Office: Wilt Twist Drill Agency, Moorgate Hall, Finsbury Pavement, London, E.C.2, Eng.

"Where there's a WILT, —there's the Way."

THE JOHNSON FRICTION CLUTCH

A SPECIAL CLUTCH BUILT AS YOU WANT IT



Standard Single Clutch with Pulley Mounted on Hub —Clutch Engaged

To machine builders we offer a service which is exceptional. The Johnson clutch can be made to conform to your own specifications—built into your machine as an integral part, not simply attached. Whatever your requirements are, we can modify our clutch to meet them.

And our continued success in this particular line insures better results than can possibly be obtained by resorting to a makeshift of your own design. The reliability of the Johnson clutch is everywhere recognized.

The leading builders of machines are incorporating clutches which we have designed especially for their use. The quality of service given is indicated by the increasing volume of their orders. We can give you the same satisfaction if you will allow us an opportunity.

Your inquiries are welcome at any time—without obligation to you. Just tell us the conditions, and when our recommendation comes to you, it will bear the stamp of engineering ability.

Write for our Yellow Data Sheets

CANADIAN AGENTS: Williams & Wilson, Ltd., 84 Inspector St., Montreal
Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto and Winnipeg

THE CARLYLE JOHNSON MACHINE CO. MANCHESTER CONN.

Electrite

Electric furnaces, automatically regulated, the most modern methods, and the introduction of Uranium — make this a steel of truly remarkable cutting properties.
We know "Electrite" cannot be bettered — and stand ready to prove it to you.

LATROBE ELECTRIC STEEL CO.
LATROBE, PA.

High Speed Steel

Uranium

Forging Billets and Bars

Electric Furnace, Alloy Steels

Die Blocks

Annealed—Heat Treated

Piston Rods

Rough Turned—Annealed—Heat Treated

High Speed Steel

General Steel Company

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TRACKWORK

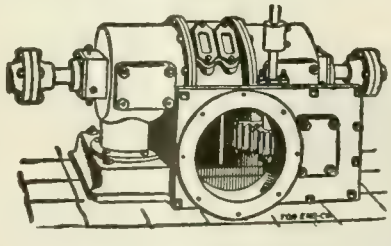
WE are builders of every description of RAILWAY TRACKWORK either as ready-to-lay Intersections, complete in every detail, or as components, such as Frogs, Switches, Mates, Diamonds, Crosses, Guards and so on. We build layouts to purchaser's designs, or we survey the site, design the layout and build it under his supervision.

Manufacturers of Balkwill Articulated Cast Manganese Crossings

CANADIAN STEEL FOUNDRIES LIMITED

Transportation Building, Montreal

WATER POWER DEVELOPMENT



Over forty years' experience in designing and installing special turbines, both on vertical and horizontal shafts.

Can supply complete equipment, including flume, turbine and power transmission.

Stock of standard vertical shaft Little Giant Turbines on hand for prompt shipment.

We solicit your inquiries.

THE J. C. WILSON MFG. CO., LIMITED

BELLEVILLE, ONTARIO

Fellow Manufacturers

We Make in Canada

Lead Pipe—Sheet Lead

Wire Solder, Bar Solder, Ribbon Solder.

Babbitt Metal For All Requirements

INGOT METALS

Copper—Tin—Lead Aluminum and Brass

Everything in Metals

Wherever you are we can serve you.

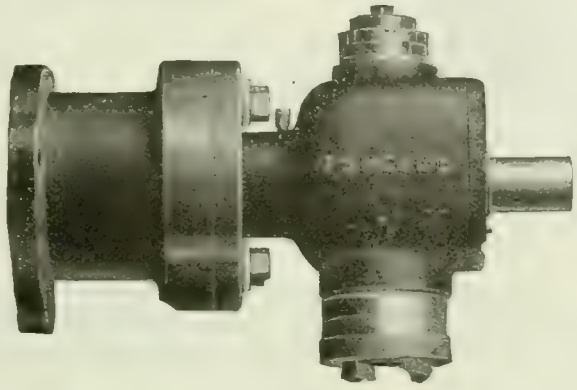
THE CANADA METAL, CO., LIMITED

Toronto, Montreal, Winnipeg, Vancouver

FORD-SMITH MILLERS

AND ATTACHMENTS

Vertical Attachment for Ford-Smith Milling Machines



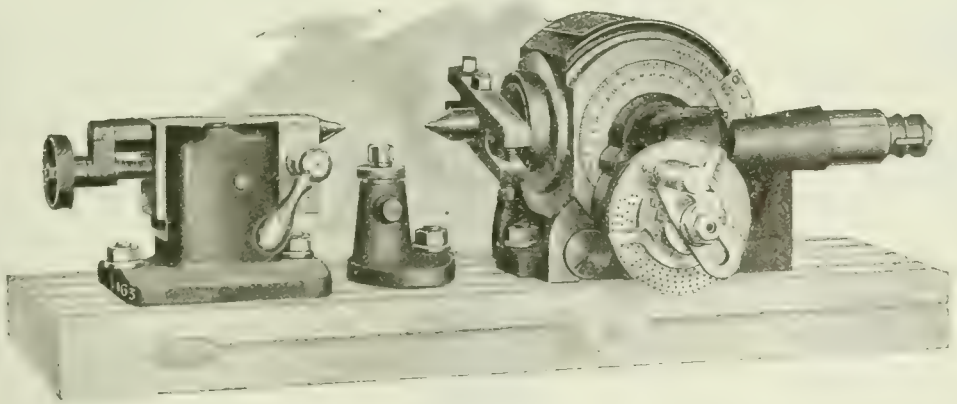
The Miller of high-grade construction—fast, accurate, and durable.

Immediate Delivery

No. 2 Plain	No. 2 Universal
No. 3 Plain	No. 3 Universal

A Ford-Smith Miller is made for every requiremeot.

The Dividing Head

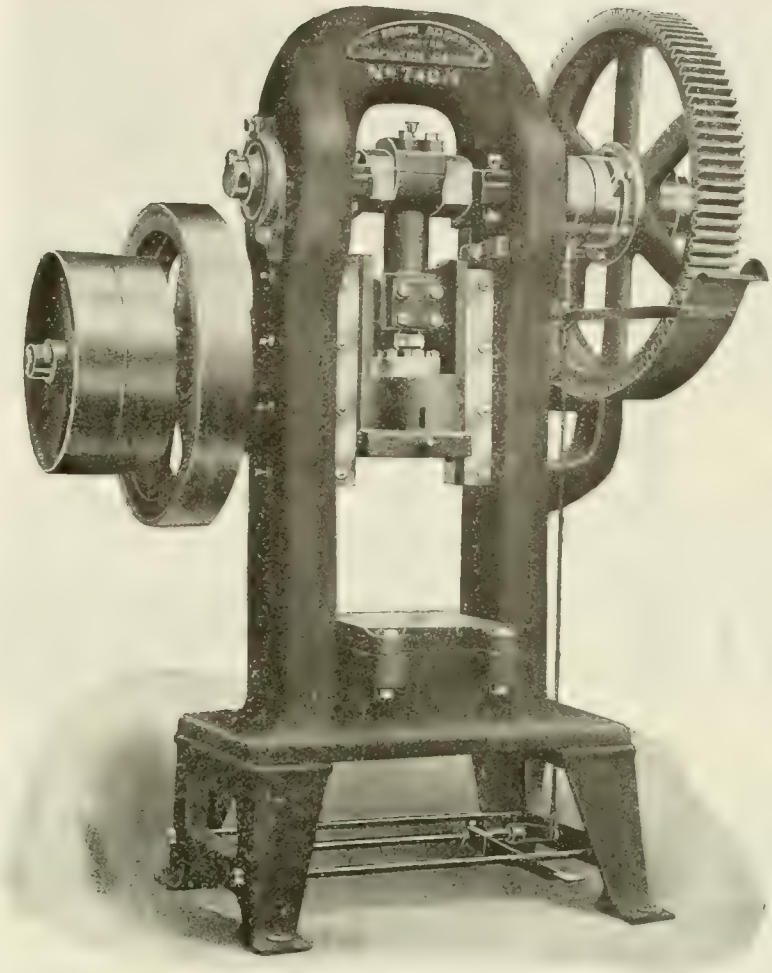


The care used in the building of Ford-Smith Dividing Heads is a fair gage of the workmanship in the entire machine. Each head is thoroughly tested for accuracy so that every finished head comes within the closest practice limits, giving satisfactory results.

Manufactured in Canada by

THE FORD-SMITH MACHINE CO., Limited
HAMILTON, CANADA

Foreign Agents: W. E. Storey, 3 Arundel St., LONDON, ENGLAND
Gollin & Co., MELBOURNE, AUSTRALIA



No. 740½ Geared Press

The Manufacturer's Guarantee

Something you do not get with second-hand equipment, yet in many cases it will offset the difference in price between the second-hand and new machine.

Play Safe, get our prices on new equipment before you close for the old.

A large stock of different sizes and styles of presses on hand for immediate shipment.

The Brown, Boggs Co., Limited
Hamilton, Canada

Manufacturers of Sheet Metal Working and Tinsmiths' Tools and Machinery, Presses, Shears, Rolls, etc.

BRITAIN'S BEST

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BRANDS OF ALLOY & TOOL STEELS

In Billets, Bars, Sheets, Hot and Cold Rolled Strips, Cold Drawn Cast Steel, Wire and Drill Rods

HIGH GRADE STEEL FOR ALL PURPOSES

KE KELOCK

Principal Trade Marks

KAYSER ELLISON & Co LTD

ESTABLISHED 1825 SHEFFIELD, ENG.

Complete Stock - Montreal Warehouse

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Agent

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FOUNDRIES & FORGINGS
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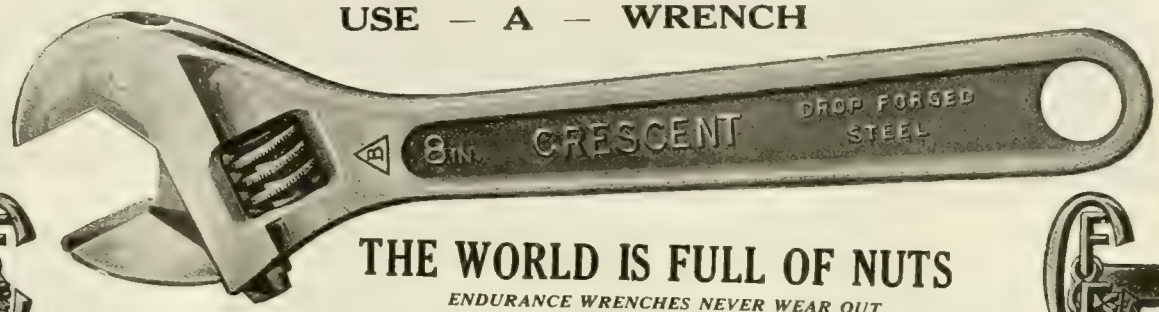
DON'T RATTLE

USE — A — WRENCH



THE WORLD IS FULL OF NUTS
ENDURANCE WRENCHES NEVER WEAR OUT
CANADIAN BILLINGS & SPENCER PLANT - Welland, Canada

Drill Steel Opportunity

25 Tons 1⅛" Cruciform Section Solid Drill Steel.

25 Tons 1¼" Cruciform Section Solid Drill Steel.

Will receive bids on lot or any portion above Steel for immediate delivery. Guaranteed quality.

ARMSTRONG WHITWORTH
OF CANADA, LIMITED

Head Office :
298-300 St. James Street,
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Branches :

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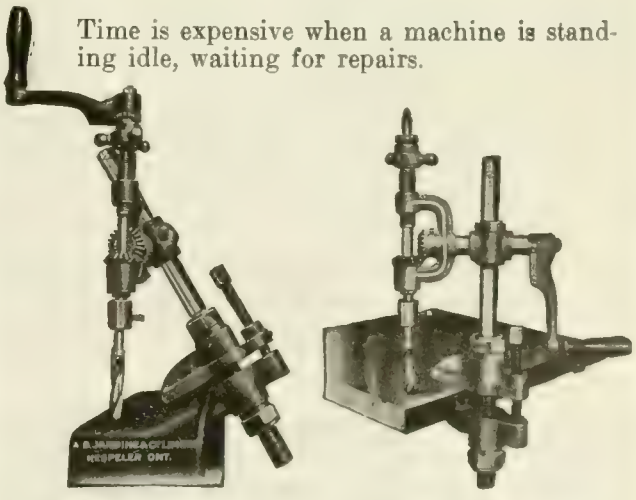
TORONTO

27 King William St.
HAMILTON

McArthur Building
WINNIPEG

Jardine Universal Ratchet Drill

Time is expensive when a machine is standing idle, waiting for repairs.



On the average repair job, this machine completes the drilling in less than the time required to set an ordinary ratchet to begin.

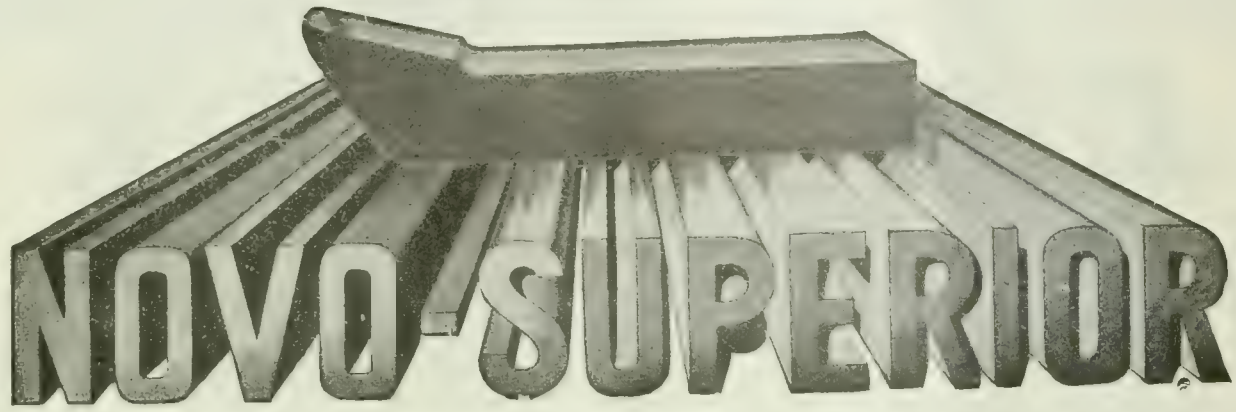
Weight, 40 lbs. Price, $26.50 net
Sold by all Machinery and Supply Houses

A. B. JARDINE & CO., Limited
HESPELER, ONTARIO

PILOT STEEL & TOOL CO., LIMITED

332 St. James Street **Montreal**

Sales Agents For—



HIGH SPEED STEEL

INTRA STEEL *GIBRALTAR STEEL*

Tool Steel for Every Purpose

We herewith announce that on and after July 1st, 1919, the firm of

H. BOKER & CO., INC., CANADA,

will be conducted under the name of

PILOT STEEL & TOOL COMPANY, LIMITED,

with head office at the above address in Montreal.

The new company will be operated as a distinctly Canadian corporation, at the same time being closely affiliated with H. Boker & Co., Inc., of New York, representing the latter in Canada.

The Pilot Steel & Tool Co., Ltd., as the Canadian representative of H. Boker & Co., Inc., New York, will act as sole agents in Canada for the entire output of Jonas & Colver, Ltd., Sheffield, England, makers of Novo Superior High Speed Steel, Novo High Speed Steel, Intra Steel, Hot and Cold Rolled Tool Steel, Circular Saws, Planer Knives, Files, etc.

All of the other lines formerly handled by H. Boker & Co., Inc., Canada, such as Gibraltar Steel, Deo Steel, Ico Steel, Music Wire, Resistance Wire, Steel Balls, Nickel Alloys, Twist Drills, Reamers, Milling Cutters, Hack Saw Blades, Small Tools, etc., will be continued to be stocked and supplied by the new company.

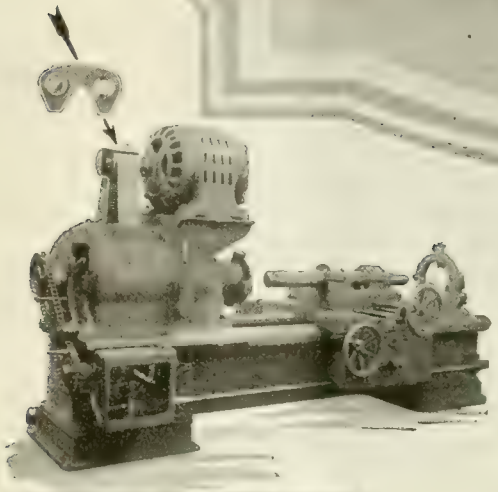
The Directorate of the Pilot Steel & Tool Co., Ltd., will be practically identical with that of the old company.

Mr. F. E. Rejall, who has been Canadian manager for a great number of years, will henceforth act as vice-president and director, and continue the management as heretofore, thus assuring a continuance of reliable and faithful service.

Yours truly,

H. BOKER & CO., INC.

PILOT STEEL & TOOL COMPANY, LIMITED.



Equip Efficient Tools with Efficient Drives

HIGHLY efficient tools are purchased to perform certain operations at a lower cost.

Effective as those machines may be, their maximum efficiency is largely dependent upon the form of drive used.

Link-Belt Silent Chain Drives deliver 98.2% of the power to the driven machine. There's no slippage of belts—no waiting for belt repairs—no inferiority of product due to ununiform application of power.

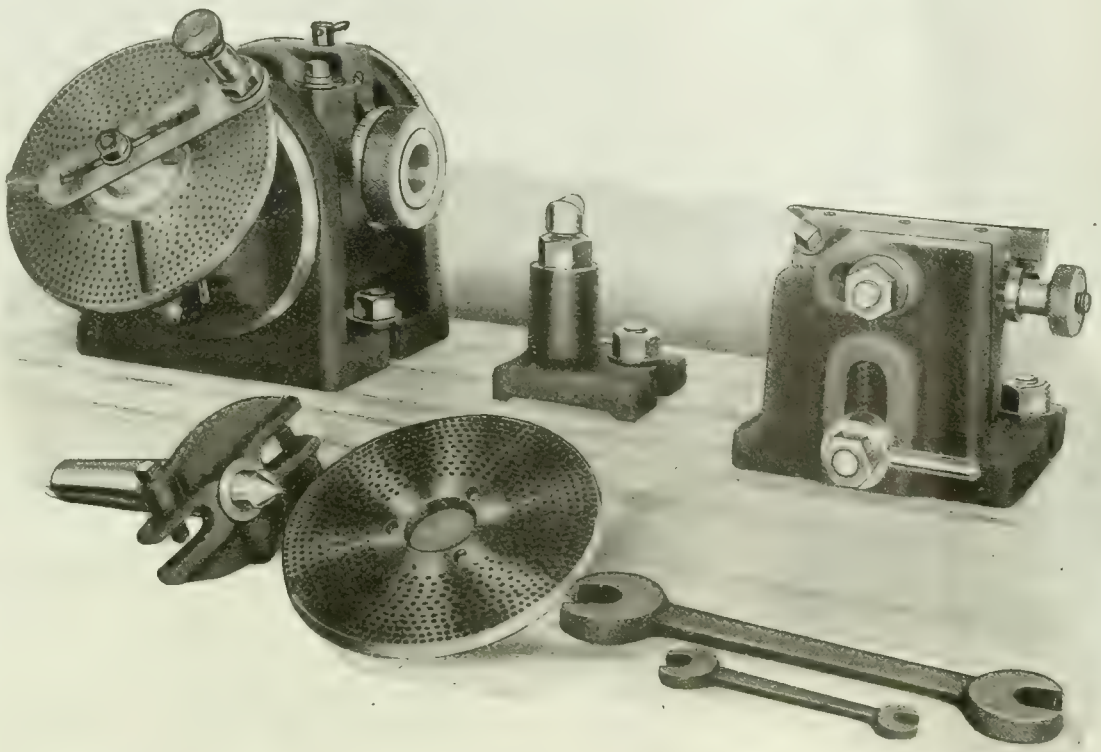
Every revolution of the motor shaft registers a like revolution of the driven shaft. Speeds are uniform. Greater speed reductions are possible. A better product results.

For Link-Belt Silent Chain Drives are "flexible as a belt—positive as a gear—more efficient than either". Write for our 40-page Machine Tool Drive Book No. 312. Shows many applications and gives full details.

CANADIAN LINK-BELT COMPANY
LIMITED
WELLINGTON AND PETER STREETS, TORONTO

LINK-BELT
SILENT CHAIN DRIVES

KEMP



A KEMPSMITH dividing head is included as regular equipment on every Kempsmith Universal Milling Machine.

Kempsmith Dividing Heads are sturdy, easy to operate and lasting.

They are accurate because of their design and because they are built that way.

Special features include large worm gear, single piece feed worm shaft and worm, powerful clamping devices and side center tailstock.

A copy of our special treatise on the Universal Dividing Head will be furnished on request.

FOREIGN REPRESENTATIVES:

Barandiaran & Co., 3 Alameda, San Sebastian, Spain; Edgar Bloxham, 12 Rue du Delta, Paris, France; D. Drury & Co., 1-2 Central House, Main St., Johannesburg, S. Africa; American Trading Co., Tokyo, Japan; Nielsen & Winther, Copenhagen, Denmark; Parke & Lacy Co., Ltd., 60 Clarence Street, Sydney, N. S. W., Australia; Selson Engineering Company, 85 Queen Victoria Street, London, E. C., England, and 19 Via Botero, Turin, Italy; Spliethoff, Beeuwkes & Company, Leuhaven, W. Z., 159 Rotterdam, Holland.

CANADIAN REPRESENTATIVES:

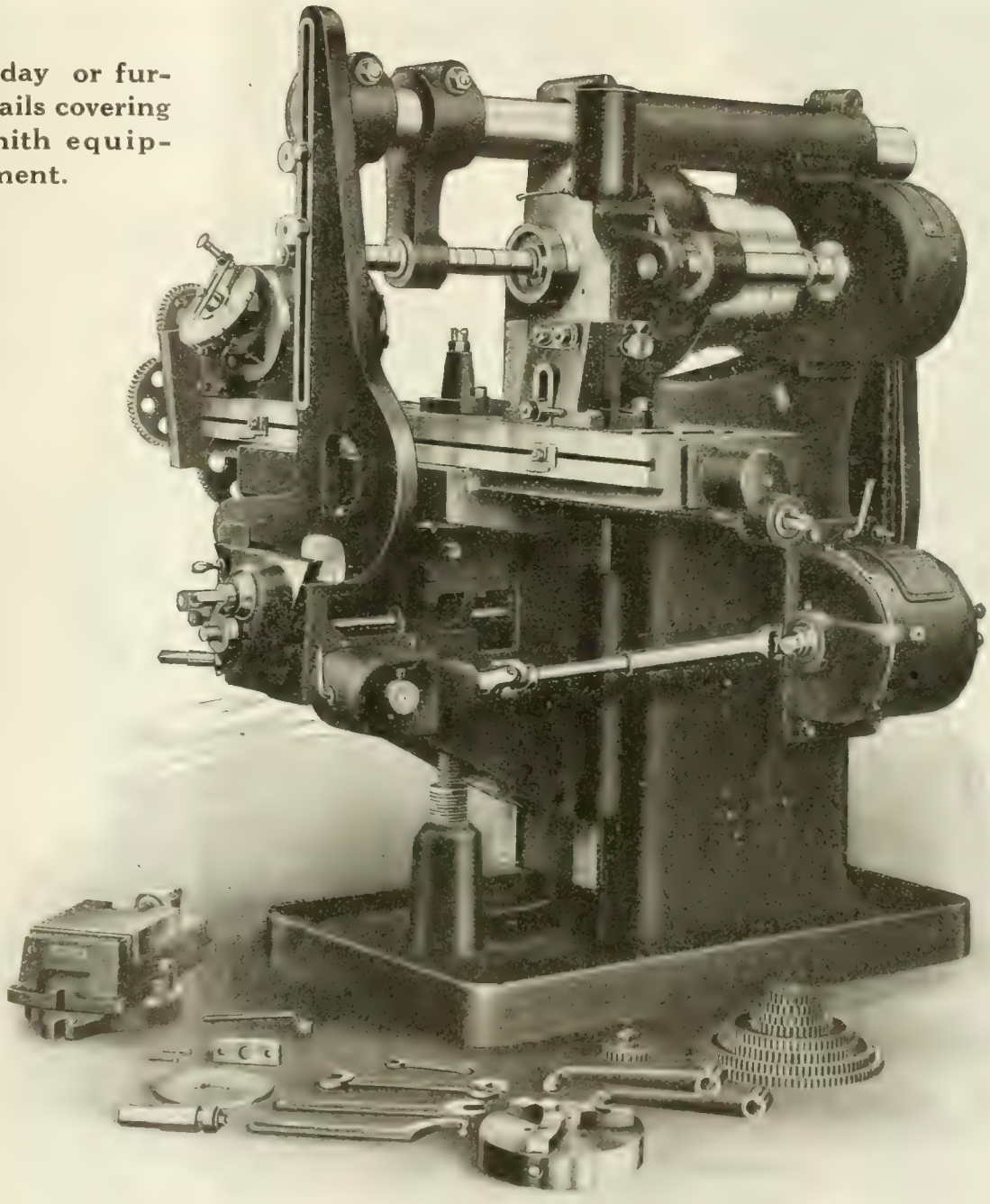
Geo. F. Foss Machy. Co., 305 St. James Street, Montreal; General Supply Co., 38 Toronto Street, Toronto, Ontario; General Supply Co., 356 Sparks Street, Ottawa, Ontario.

The Kempsmith

Milwaukee,

SMITH

Write today or further details covering Kempsmith equipment.

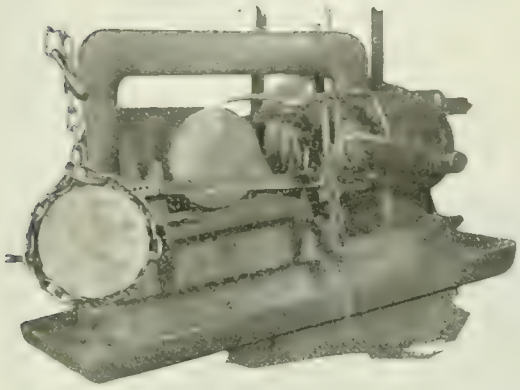


KEMPSMITH No. 3 Universal Milling Machine
Double Back Geared

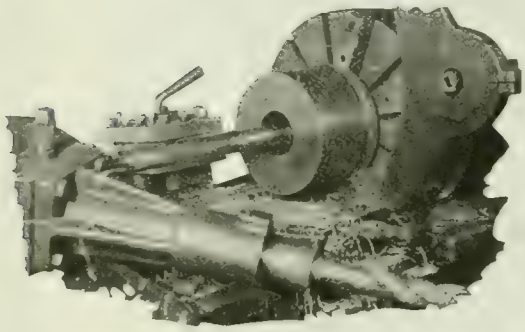
Mfg. Co.
Wis., U. S. A.

STEEL SPUR PINIONS

Showing the operations in their production



First, the blank is sawn off a forged bar. We carry a large stock of open hearth rounds up to sixteen inches diameter.

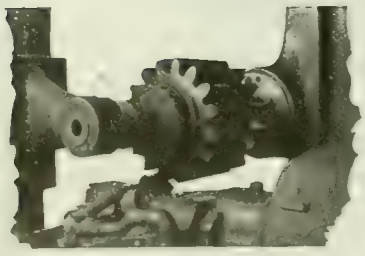


Turning the blank for pinion in chuck on heavy turret lathe.

Write or wire

HAMILTON GEAR CO. LTD.

Van Horne St., TORONTO



Cutting the teeth on a Brown & Sharpe No. 6 Gear Cutter.

Cutting Key Way on M. & M. "Giant" Key Seater,

A careful final inspection protects you in the quality of Hamilton Gears you purchase.

STELLITE

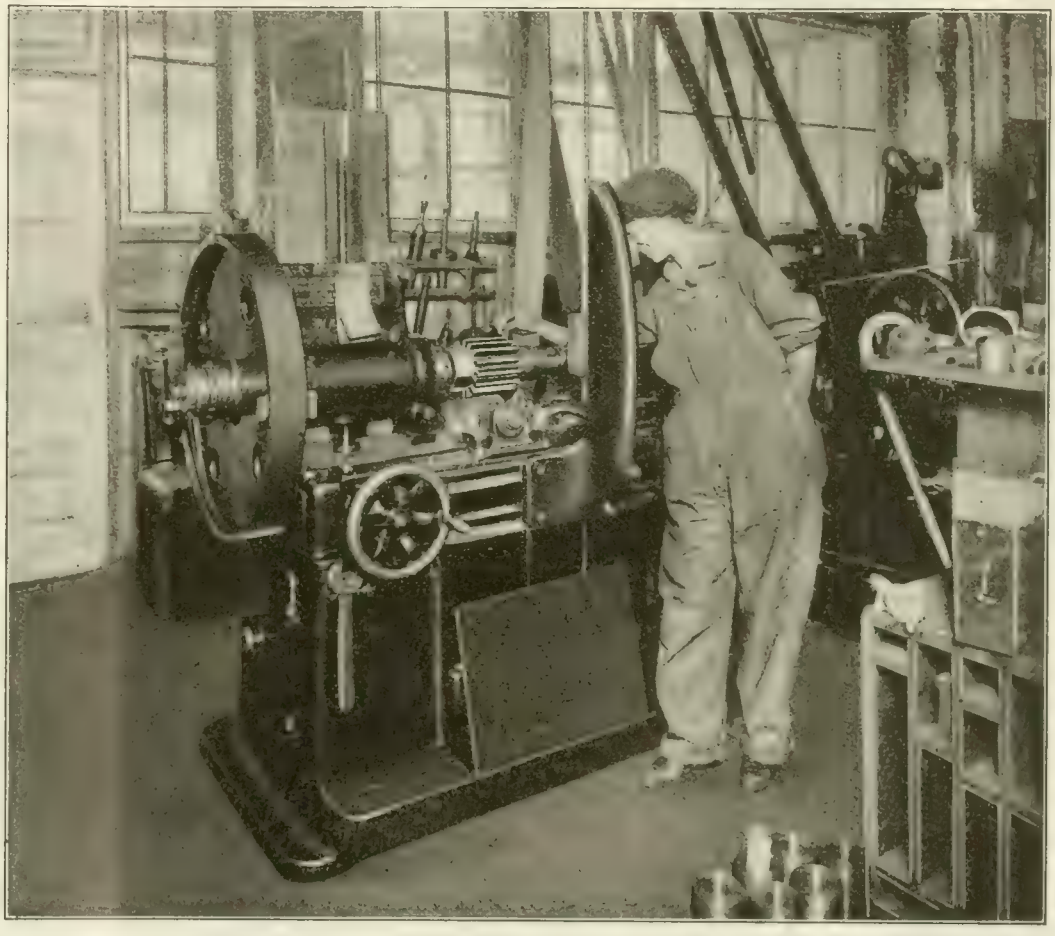
"Not Steel but its Master"

Increase Your Production

without new equipment or additional help

by using

"STELLITE" CUTTING TOOLS



The above cut illustrates a No. 4 Pitch Built-up Stellite Milling Cutter milling gears at the plant of the Hamilton Gear & Machinery Co., Ltd., Toronto.

Speed of Cutter 80 R.P.M. Feed 2 7-32 inch. per minute.

The life of the Stellite Cutter is longer than H.S. and the initial cost is lower.

Stellite in bars with tool holder is cheaper than best tool steel, production and life considered. Better write now.

Made in Canada

Deloro Smelting and Refining Company, Limited

Head Office and Works, DELORO, ONT.

TORONTO
200 King Street West

MONTREAL
315 Craig Street West

"WACO"

High Speed Steel

REGISTERED

"WACO"

TRADE MARKS

"Double Waco" Quality—for Quick Production Work.

"Turtle Brand"—High-class Tool Steels, Files and Drills.

Wortle Plates for Wire Drawers.

MANUFACTURED BY

WM. ATKINS & COMPANY, LIMITED

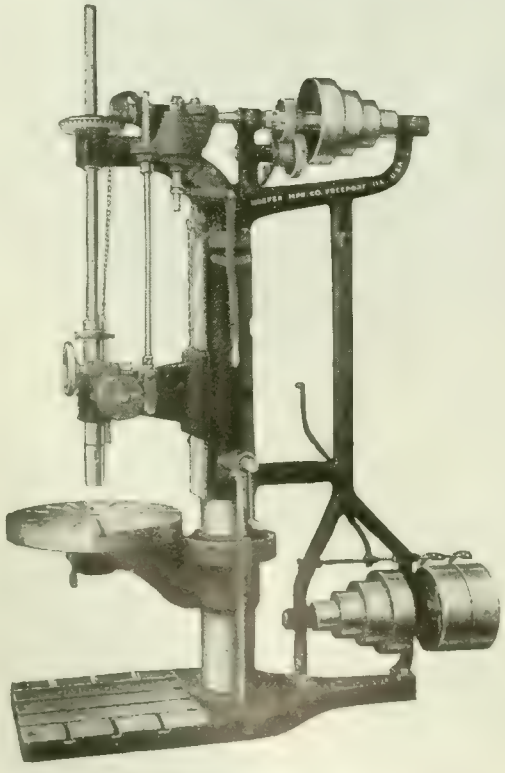
RELIANCE STEEL WORKS Established 1870 SHEFFIELD, ENGLAND

Sole Representatives for Canada:

MARSHALL, SON & BUNNEY

39 Richmond Street East - - - TORONTO, ONT.

The Driller for Exact Work



HŒFER

Enable Your Workmen to Eliminate Spoilage

The Hoefer Driller is pre-eminently the one to be found in the best plants. "It's almost as good as a Hoefer," so often heard in the machine and tool trade, indicates the position held by Hoefer Drillers.

Exact drilling, to the last thousandth of an inch, pays by eliminating spoiled material. Hoefer Drillers pay for themselves and increase the workman's pride in his work.

Twenty-five Years on Market

Twenty-five years making drillers has given Hoefer the "Know-how." The Hoefer Drillers are used by many of America's leading manufacturers. Equip your factory the Hoefer way. Take any kind of a drilling problem you have to the Hoefer Manufacturing Company, and the Company's experts can tell you how it was solved by other men, some of whom you may know.

Investigate now. Write to-day for catalog. The Hoefer engineers are at your service.

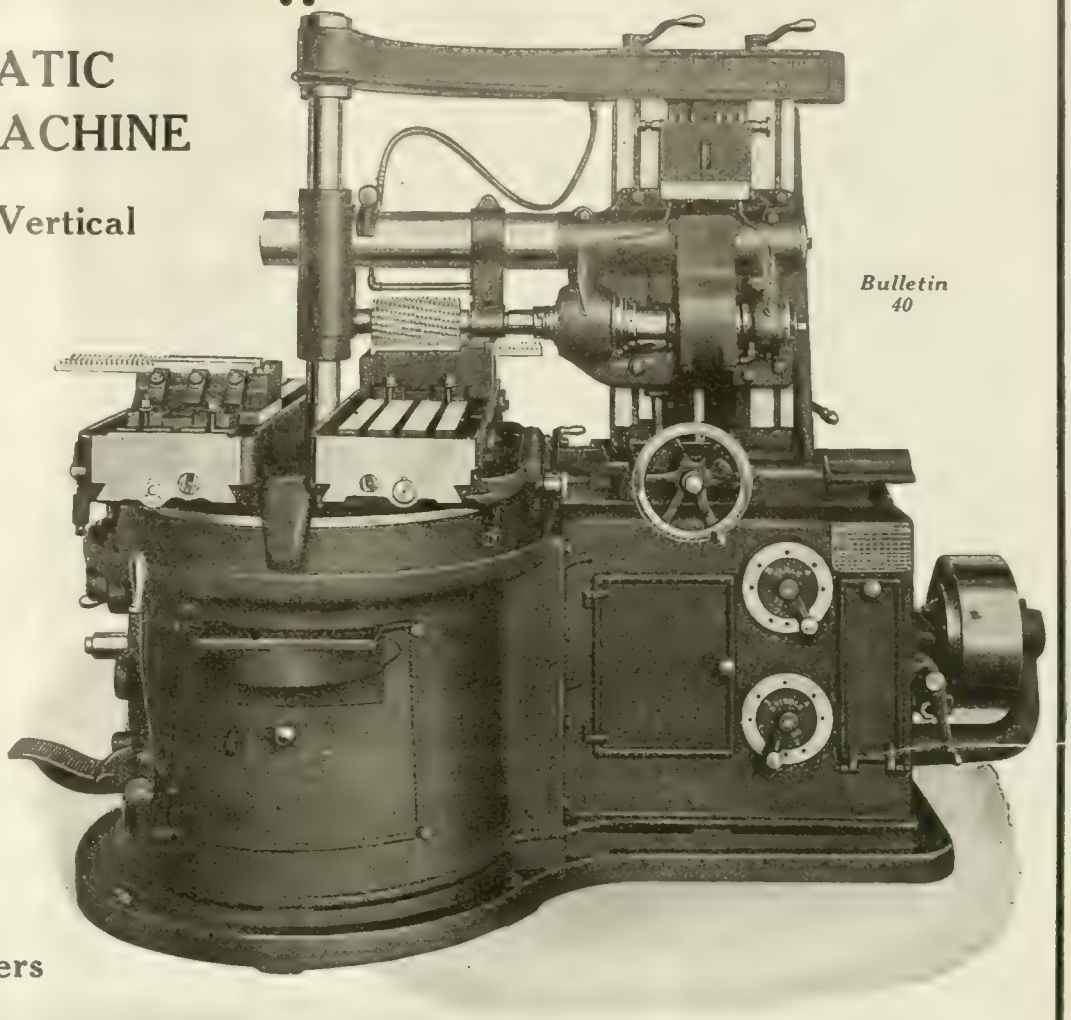
HOEFER MFG. CO.

FREEPORT, ILL.

POTTER & JOHNSTON

AUTOMATIC MILLING MACHINE

Horizontal---Vertical



Bulletin 40

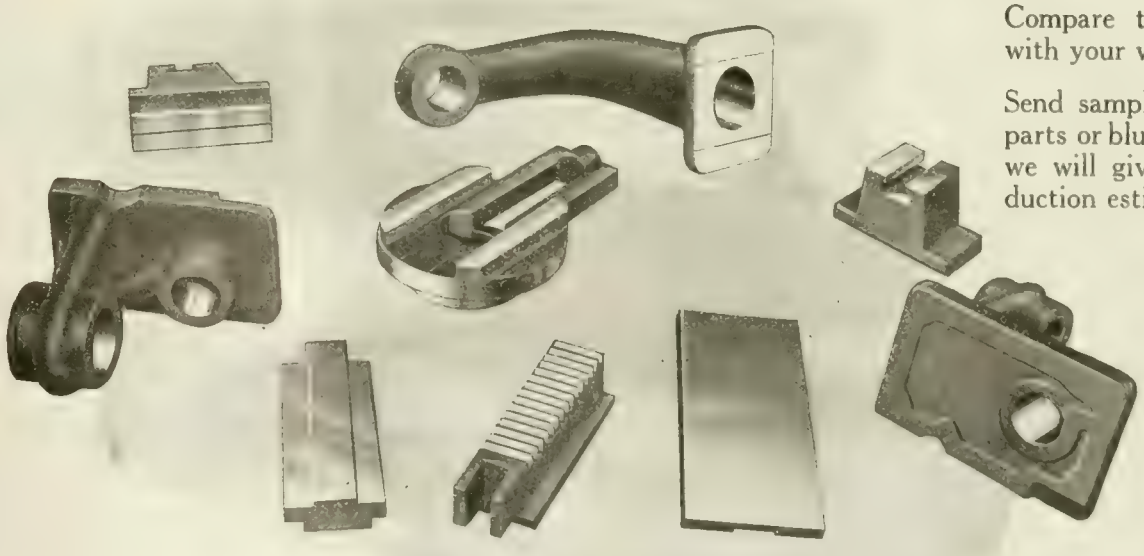
Continuous Milling

The operator is loading one fixture while the cutter operates on the other. No lost time due to machine idleness, therefore

Increased Production

16 Table Feeds 7/8 to 12 5/16. Length of Table Feed 29 inches. 12 Spindle Speeds, 20 to 180 R.P.M.

Typical Jobs for the
Automatic Millers



Compare these parts with your work.

Send samples of your parts or blue prints and we will give you production estimate.

Canadian Offices: POTTER & JOHNSTON MACHINE CO.

ROELOFSON MACHINE & TOOL CO., LTD.

Head Office: 1501 Royal Bank Building, Toronto, Canada Works and Warehouse: Galt, Ont., Canada

MEN whose souls have been tried in the Crucible of War Time Service will not easily forget those forces, either Human or Mechanical, which were instrumental in achieving Victory.

"Red Cut Superior"

The Nationally Known FIRST QUALITY

HIGH SPEED STEEL

Is a Fighter for Efficiency in Peace Times and War Times.

Are your Tools made of "Red Cut"?

VANADIUM-ALLOYS STEEL CO.

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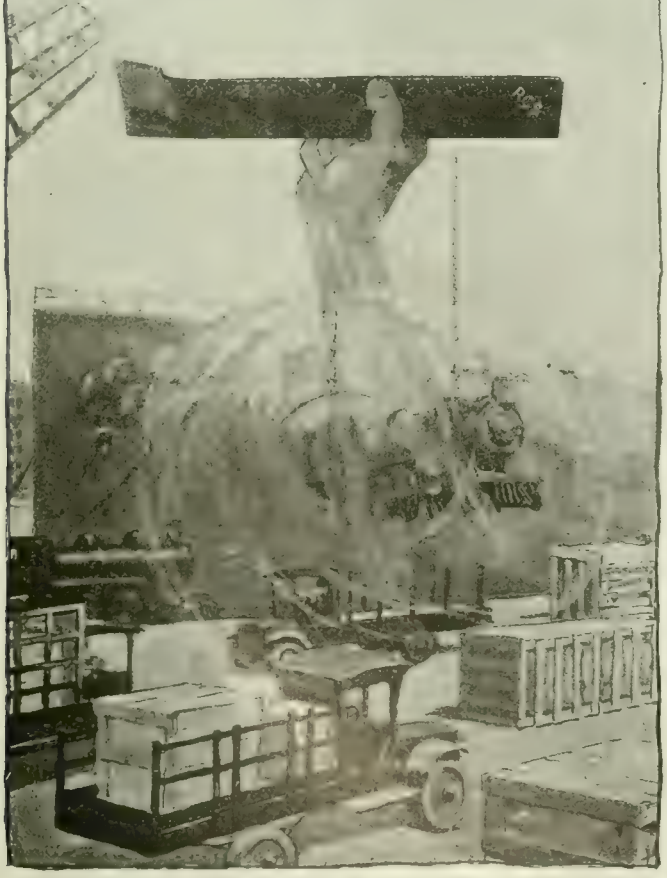

The Scientific Metallic Blasting Abrasive—

ANGULAR GRIT

One ton of ANGULAR GRIT equals carloads of sand. Its angular and irregular cutting points clean raw castings and forgings quicker and better than either sand or shot.

No dust, no sand bins or sand dryers are necessary where ANGULAR GRIT is used.

Trade Mark Reg. U.S. Pat. Office

Cuts Sand-Blast Costs

Give ANGULAR GRIT a trial and note the difference between it and shot Globules or sand which you may be using. You'll save much labor and reduce your blasting cost anywhere from 20% to 80%.

Pittsburgh Crushed Steel Co.

Established 1888

PITTSBURGH, PA., U.S.A.

Canadian Representatives:
Williams & Wilson Ltd.
Montreal, P.Q.

STEEL *for*

Every Commercial Purpose

We are the only company in Canada producing steel ingots by the "HARMET" Liquid Process, a process that makes these ingots vastly superior to the ordinary kind, improving the physical properties and reducing the waste of ingot.

We can supply forgings of all shapes and sizes made of ordinary or "HARMET" Fluid Compressed Open-Hearth Steel on the Shortest Notice.

Nova Scotia Steel and Coal Co., Limited

Head Offices:
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Steel Ingots
by the
HARMET
Liquid Process

Coal
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Victoria FOUNDRY & MALLEABLE

Made by The Canadian Furnace Co.
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FIRTH'S Speedicut HIGH SPEED Steel

Insures Maximum Production

FIRTH'S CARBON TOOL STEELS
Standard Brands Highest Quality

THOS. FIRTH & SONS, Limited, Sheffield, England

CANADIAN WAREHOUSES: 469 St. Paul St. West, MONTREAL; 79 West Adelaide St., TORONTO

J. A. SHERWOOD
Canadian Manager

A WALL RADIAL DRILL

That Puts Dollars in Your Pockets

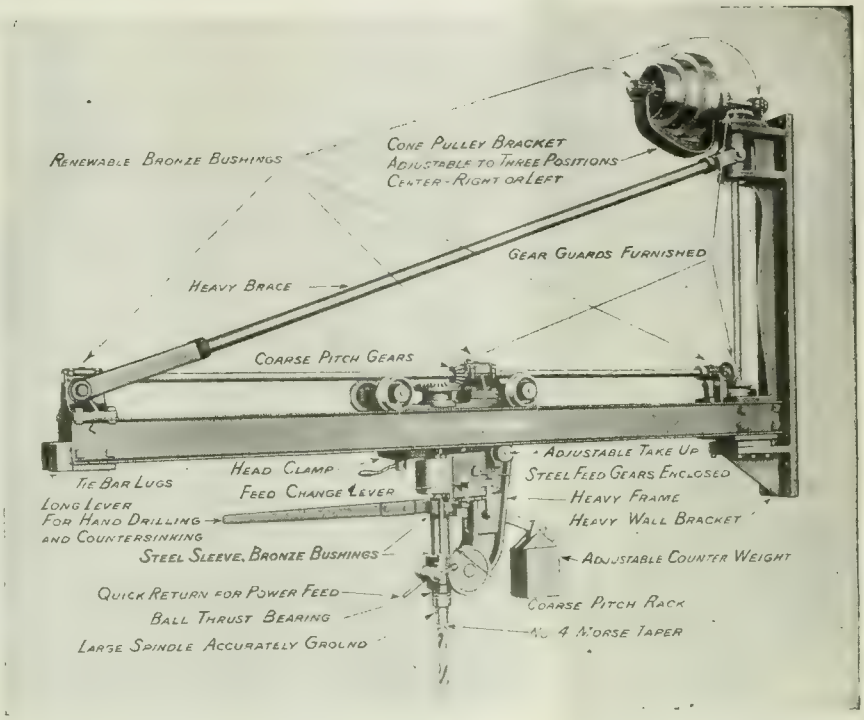
Here's a real machine tool in the wall radial drilling line for your consideration. Listen to this—the machine is made of high grade materials throughout, and the workmanship is beyond criticism. It is designed with the particular idea of maximum production, at a minimum operating expense. Entire control within easy reach makes the operators "boosters" for these machines. You can keep the dollars that may be slipping away on your wall radial drilling propositions, in your pocket by the installation of this machine.

Send for Detailed Bulletin

MADE IN FOUR STANDARD SIZES.

Rated size	Drills to centre of	Wall to end of arm
7 ft.	14 ft. circle	10 ft.
9 ft.	18 ft. circle	12 ft.
11 ft.	22 ft. circle	14 ft.
13 ft.	26 ft. circle	16 ft.

F.O.B. Boston, Mass.



LYND-FARQUHAR COMPANY

419-425 Atlantic Avenue **BOSTON, MASS.**

HOYT METALS

"Frost King"
"Trojan"
"Nickle Genuine"
BABBITTS

Hoyt Metals have been used with great success for many years.
Put them to the test and you'll soon see a difference in your babbitt cost.
All elements entering into our mixtures are carefully refined and put together in such proportions and in such relation to each other that the best possible alloy is secured for the work for which it is designed.
Annual sales over $5,000,000.

Hoyt Metal Co., Toronto

New York, N.Y. London, Eng. St. Louis, Mo.

THE

TRADE K–T MARK

FOUNDRY

GALT - ONT.

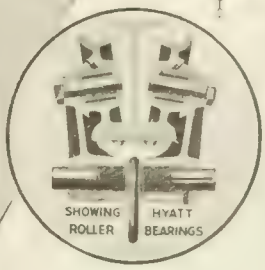
Do Your Castings Cost Too Much?

A rearrangement of your patterns might cut their cost 25%; a different method of molding them might double your production at no increase in molding cost. **We can advise you** and we have expert metal and wood pattern-makers who are able to make any changes that may commend themselves to you.

If you need some new Patterns

send us a sample, blueprint or sketch, and ask for our advice. It won't cost you anything. If our advice is good and commends itself to you, it is only fair to assume that our work will be equally satisfactory, and we need the work as badly as you need the patterns.
We are in a position to do turning, boring, drilling or other semi-finishing operations on castings supplied by us.

ASK US



Equipment of Proved Quality

CURTIS Easy Rolling Cranes and Trolleys—Steel Air Hoists—and Controlled Splash Oiling Air Compressors—have proved their effectiveness during many years' actual operation. In leading foundries they have demonstrated their economy, dependability and freedom from trouble.

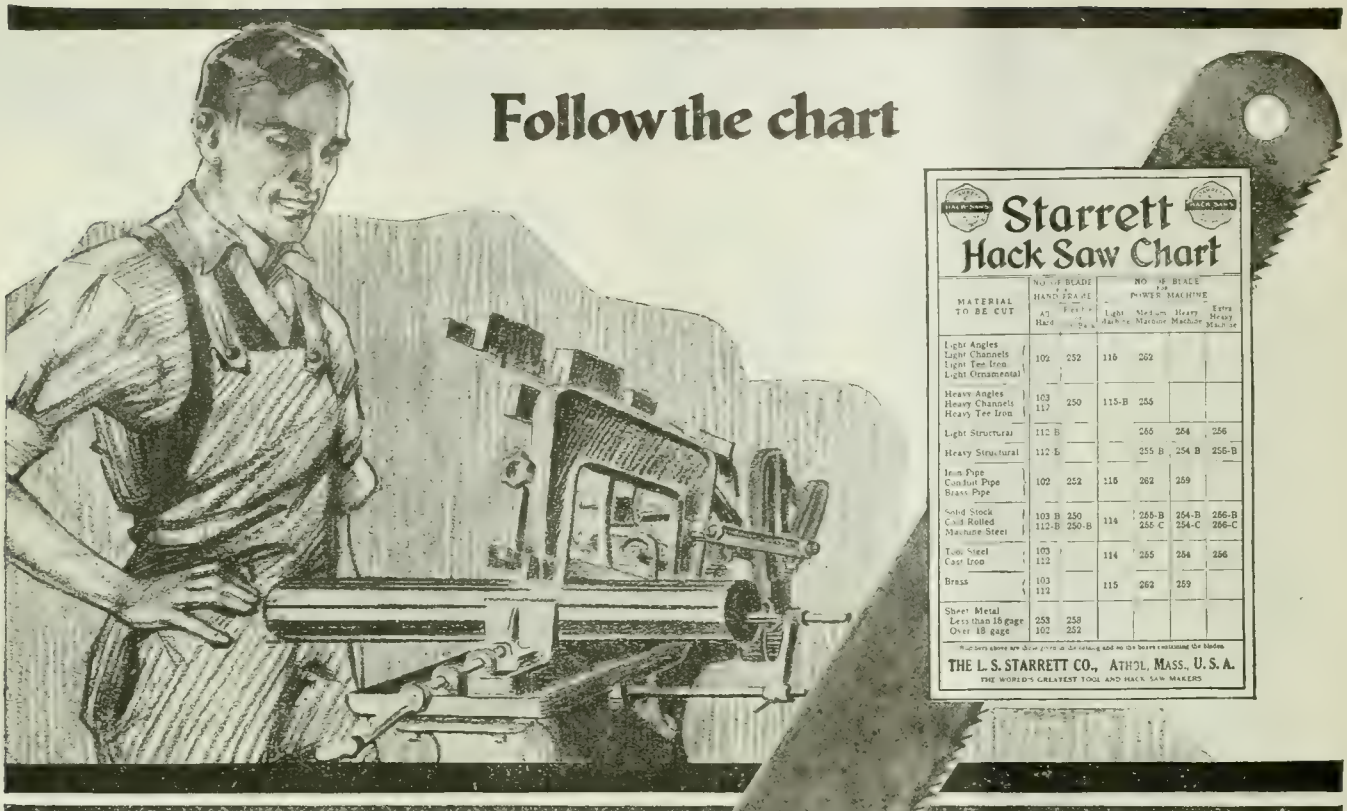
They are the result of over 25 years' experience in the manufacture of this particular kind of equipment. Good material, correct design and conscientious workmanship assure safe and dependable service under the most exacting operating conditions. Our engineering department is ready to study your problems and recommend equipment best suited to your needs.

Illustrated literature covering mechanical features and other details of Curtis equipment will be sent at your request.

CURTIS PNEUMATIC MACHINERY CO.
1585 Kienlen Avenue St. Louis, U. S. A.

Branch Office
532-A Hudson Terminal
New York City

CURTIS Products



Follow the chart

Starrett Hack Saw Chart

MATERIAL TO BE CUT	NO. OF BLADE FOR HAND FRAME		NO. OF BLADE FOR POWER MACHINE			
	All Hard	Flexible Back	Light Machine	Medium Machine	Heavy Machine	Extra Heavy Machine
Light Angles, Light Channels, Light Tee Iron, Light Ornamental	102	252	116	262		
Heavy Angles, Heavy Channels, Heavy Tee Iron	103, 117	250	115-B	255		
Light Structural	112 B			255	254	256
Heavy Structural	112 B			255 B	254 B	256-B
Iron Pipe, Conduit Pipe, Brass Pipe	102	252	116	262	259	
Solid Stock, Cold Rolled, Machine Steel	103 B, 112-B	250, 250-B	114	255-B, 255 C	254-B, 254-C	256-B, 256-C
Tool Steel, Cast Iron	103, 112		114	255	254	256
Brass	103, 112		115	262	259	
Sheet Metal: Less than 18 gage	253	253				
Sheet Metal: Over 18 gage	102	252				

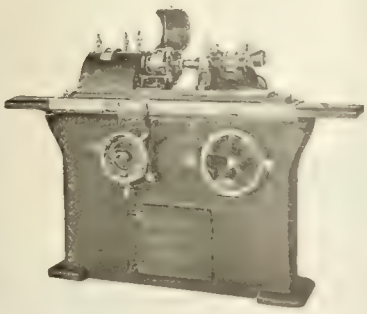
Blades above are also given in the catalog and on the boxes containing the blades.

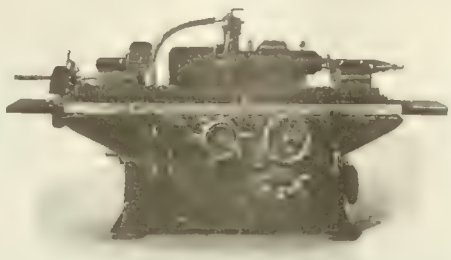
THE L. S. STARRETT CO., ATHOL, MASS., U. S. A.
THE WORLD'S GREATEST TOOL AND HACK SAW MAKERS

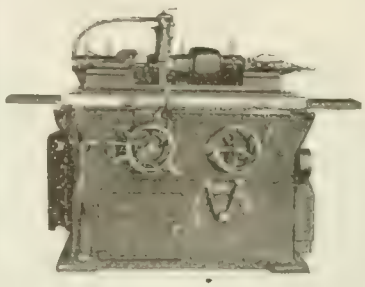
Watch the cost per cut and the cutting cost per job will take care of itself. Different metals, cut at different speeds need different blades. Follow the Starrett Hack Saw Chart and for economy's sake use

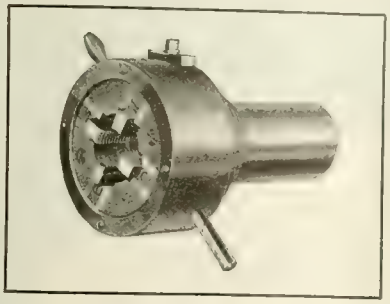
Starrett Hack Saws

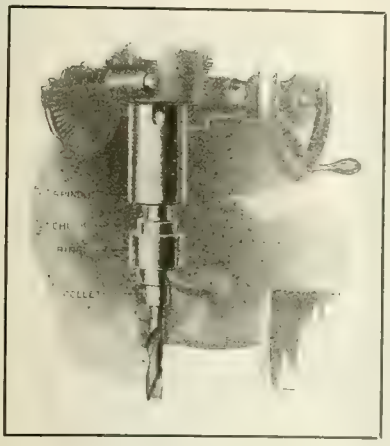
42-953











MODERN TOOLS

MAKE BUSINESS HUM

The Modern Line supplies indispensable aid in business progress. Modern Tools are precision tools of the finest quality, noted for accuracy, dependability, volume of output and durability. We make:

—**Modern Plain Grinders**
10 sizes—8″ x 18″ to 16″ x 60″.

—**Modern Internal Grinders**
One model with fixtures in 3 sizes.

—**Modern Universal Grinders**
Normal range 13″ to 40″.

—**Modern Chaser Grinders**
For any chasers with parallel sides and general tool room work.

—**Modern Self-Opening Die Heads**
18 sizes—for threads up to 7 inches.

—**Modern "Magic" Chucks**
For quick change of tools on live spind'e machine.

—**Modern Collapsible Taps**
3 sizes—Will tap holes $\frac{3}{4}$″ to 3″.

—**Modern Tapping Attachments**
For driving tools "through" or "to bottom."

All are tools of widespread use in the States—all have enviable records for reducing costs and speeding up production.

Send for technical bulletin of any which may interest you.

Send us your specifications and blue prints for data on your particular kind of work.

INDUSTRIAL REVIVAL DEPENDS ON YOU

Start your own ball a-rolling.

Remember the order you give goes to the man who buys from the chap who orders from you.

MODERN TOOL CO.

Main Office and Works: ERIE, PA. STATE AND PEACH STS.

Canadian Agents: Rudel-Belnap Machinery Co., Limited, Toronto and Montreal

Branch Offices:

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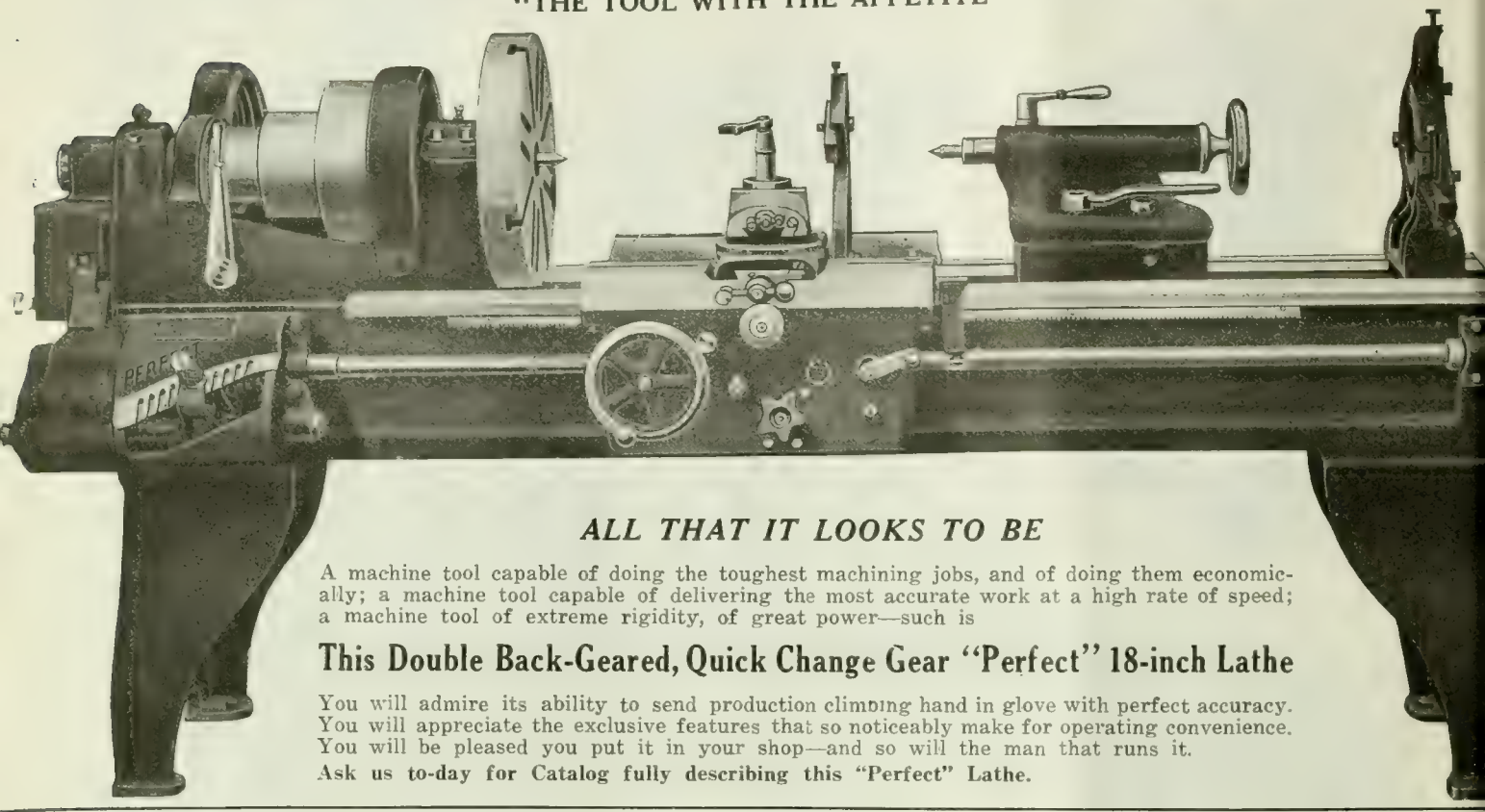
Chicago, Ill., 32 N. Clinton St.
Cleveland, Ohio, Guardian Bldg.
Detroit, Mich., 1223 Dime Bank Bldg.
Cincinnati, Ohio, 2 Greenwood Office Exch.
Export Department, 2 Rector St., N.Y.C.

THE PERFECT 18-INCH LATHE

"THE TOOL WITH THE APPETITE"



ALL THAT IT LOOKS TO BE

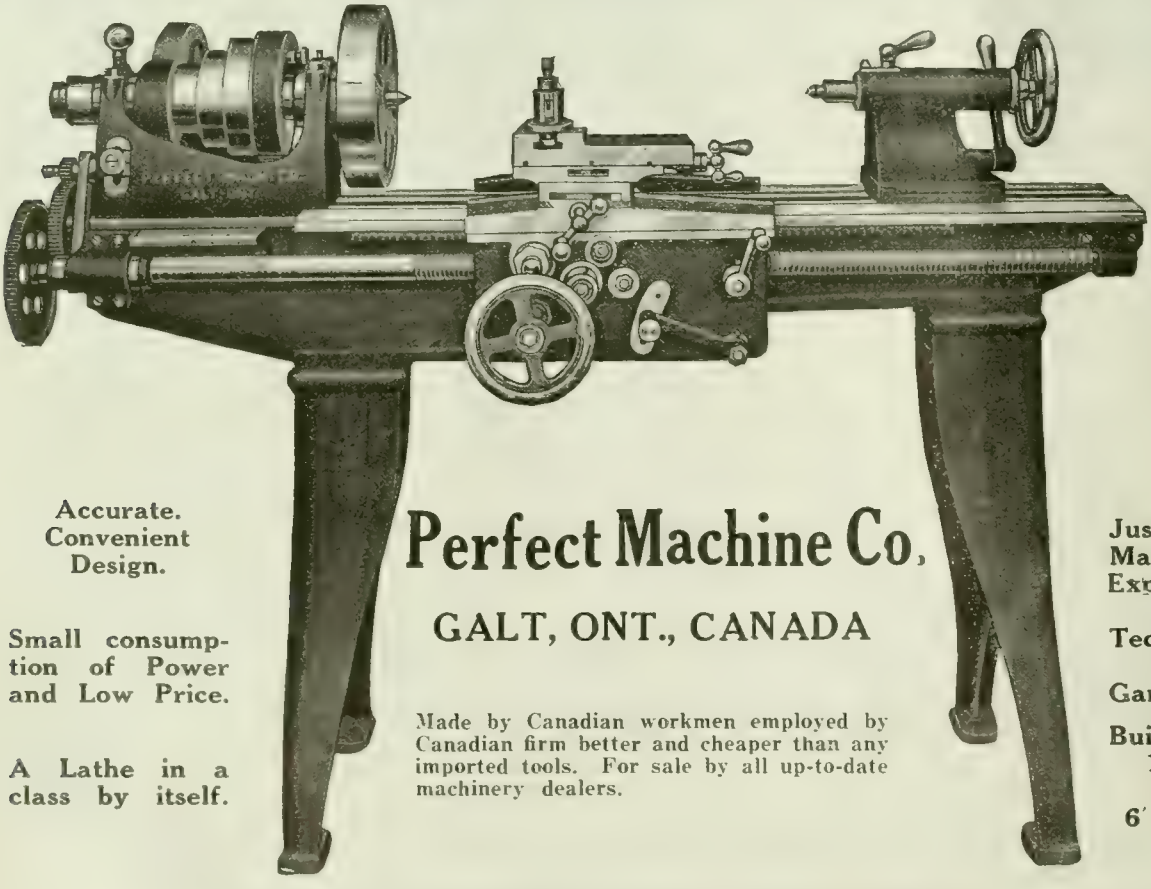
A machine tool capable of doing the toughest machining jobs, and of doing them economically; a machine tool capable of delivering the most accurate work at a high rate of speed; a machine tool of extreme rigidity, of great power—such is

This Double Back-Geared, Quick Change Gear "Perfect" 18-inch Lathe

You will admire its ability to send production climbing hand in glove with perfect accuracy. You will appreciate the exclusive features that so noticeably make for operating convenience. You will be pleased you put it in your shop—and so will the man that runs it.

Ask us to-day for Catalog fully describing this "Perfect" Lathe.

SCREW CUTTING ENGINE LATHE WITH GAP



Accurate. Convenient Design.

Small consumption of Power and Low Price.

A Lathe in a class by itself.

Perfect Machine Co.

GALT, ONT., CANADA

Made by Canadian workmen employed by Canadian firm better and cheaper than any imported tools. For sale by all up-to-date machinery dealers.

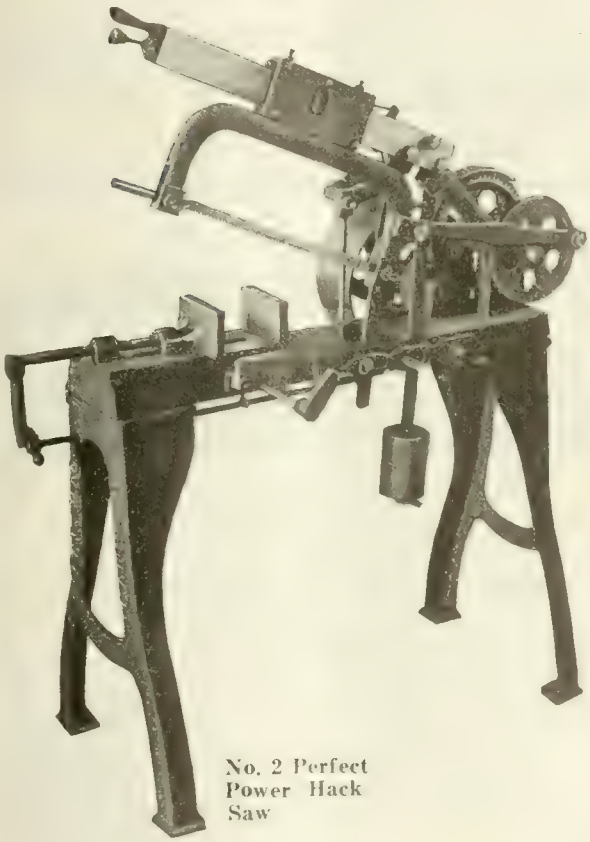
Just the Tool for Machine Shops, Experimental Shops, Technical Schools, Garages, Etc.

Built in 2 sizes, 12″ and 14″ swing, 6′ and 8′ Bed.

WE GUARANTEE EVERY TOOL WE MAKE.

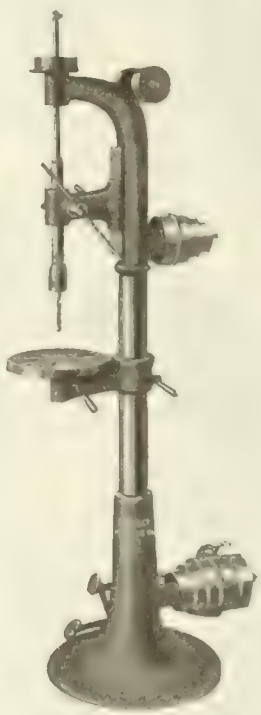
These grinders have stood the test, they're rigid. The wick oiling device can't go wrong. They're built right, with the proper material, by expert workmen.

Guards and Exhaust Hoods furnished on request. The Heads alone can be used for Bench Grinders. The ordinary tight and loose pulley C.S. furnished unless otherwise ordered.



No. 2 Perfect Power Hack Saw

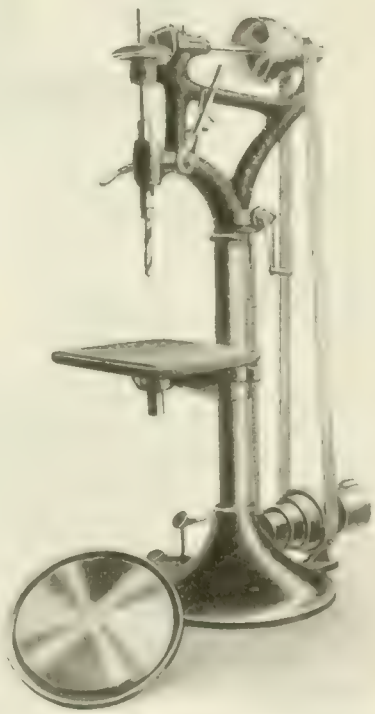
Length of blade, 10" to 12".
Stroke of blade, 6".
Cutting capacity, 5" x 5".
Tight and loose pulleys, 10" diam., ¾" face.
Geared 3 to 1.
Swivel vise adjustable to 45 degrees angle.
Vise jaws 3" high, 4½" wide, 6" opening.
Floor space, 17 x 36.
Net weight, 190 lbs.



Perfect No. 14 Drill

A high class drilling Machine. Speed 2 000 R.P.M., drills from 0 to ½".

Looks Right
Acts Right
because it's built right.



Perfect No. 19 Drill

Geared 2 to 1 and is driven by a 2" flat belt. It has lots of power, handles a drill from 0 to 29 32.

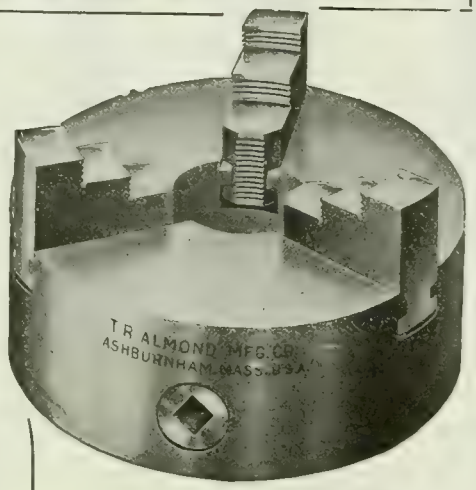
This is a good tool, you don't realize it until you compare it with other 18" or 20" drills.

PERFECTLY BUILT BY EXPERT WORKMEN.
WE GUARANTEE EVERY TOOL WE MAKE.

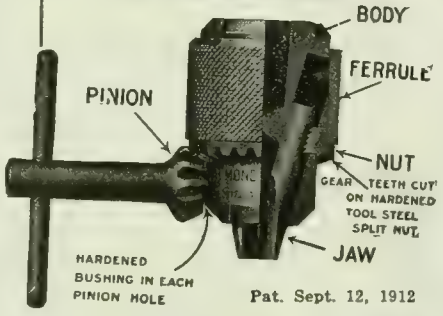
Perfect Machine Company, Galt, Ont.

ALMOND
CHUCKS & MICROMETERS

Give them a try out. Universal Geared Scroll Chuck—Sizes 5", 6", 7½", 9" and 12".



Geared Nut Drill Chucks, in various capacities, 0" to 1".

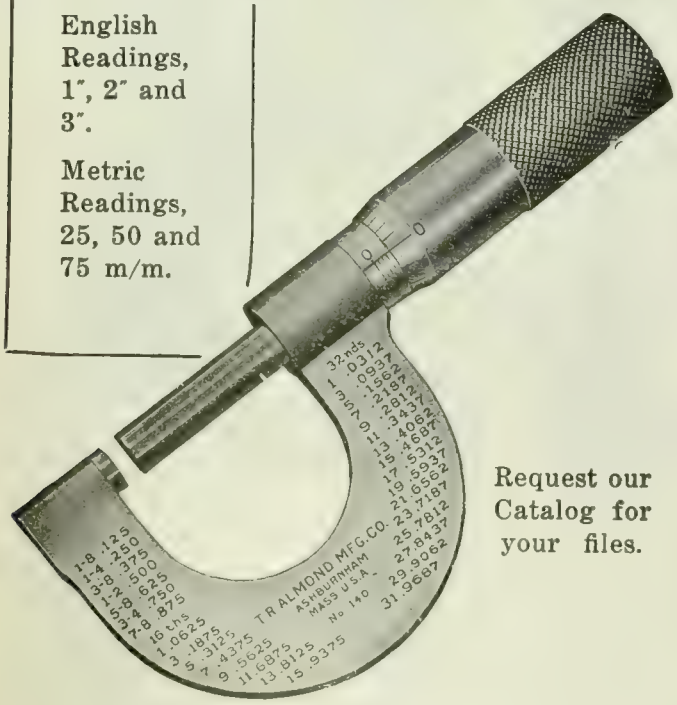


Pat. Sept. 12, 1912

Micrometer Calipers—

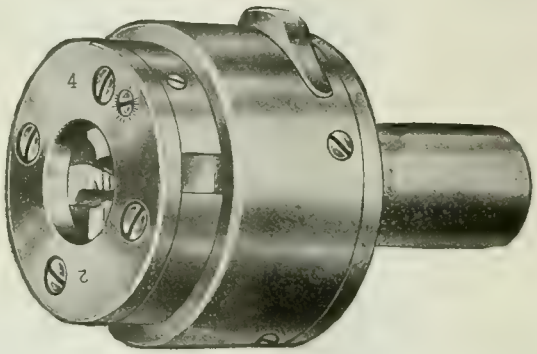
English Readings, 1", 2" and 3".

Metric Readings, 25, 50 and 75 m/m.



Request our Catalog for your files.

T. R. ALMOND MFG. CO.
6 Maple Avenue, Ashburnham, Mass.



H & G Die Heads

are of small outside diameter compared with the size of work they do.

The H. & G. illustrated is an automatic, self-opening Die Head designed especially for use on Gridley and National Acme Multiple Spindle Screw Machines and others that use the die in a revolving position. The four sizes of this Head cut up to 9/16", 1", 1¼" and 1½".

All parts are hardened and ground and interchangeable. In a word—it's an H. & G.

Ask for Catalog

Eastern Machine Screw Corp.
New Haven, Conn., U.S.A.

CUSHMAN

We've been Manufacturing

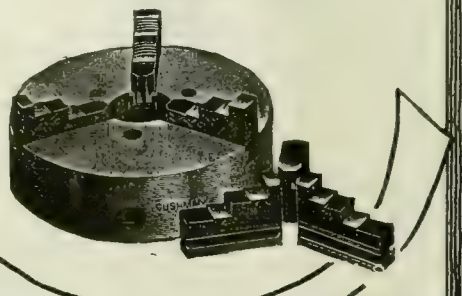
Nothing but Chucks and Their Accessories

FOR NEARLY 60 YEARS

AND OUR PRODUCTS SHOW IT

Years of experience in using our tools has convinced manufacturers that the word "Cushman" stamped upon a chuck is a guarantee of its quality and efficiency.

Let us send you our catalogue.
Cushman Chuck Co., Hartford, Conn., U.S.A.



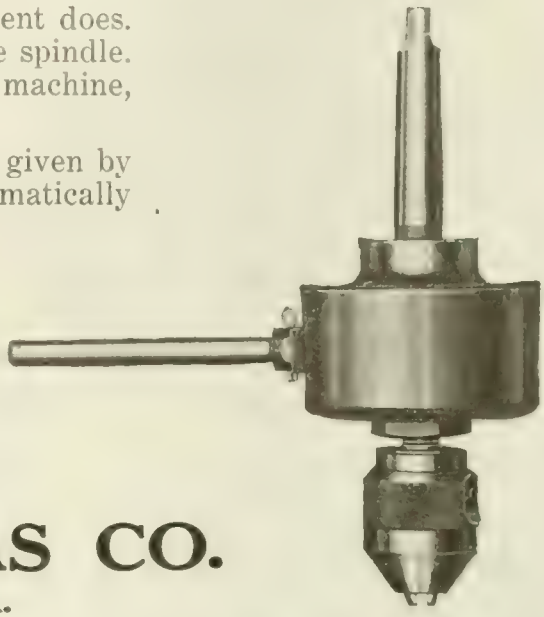
"B-T" Reverse Tapping Attachment

Saves Tap, Time and Trouble

That is what the "B-T" Reverse Tapping Attachment does. It eliminates the necessity of reversing the machine spindle. Simply raising the spindle reverses the tap—the machine, meanwhile, goes ahead at full forward speed.

A reverse speed twice that of the tapping speed is given by an internal gear drive. It is friction driven—automatically adjusted by the amount of pressure the operator puts on the drill spindle. It saves taps, trouble, time and money.

Can also be had with positive drive. Both plain and friction chucks are fitted with jaws to grip round and square end of tap.



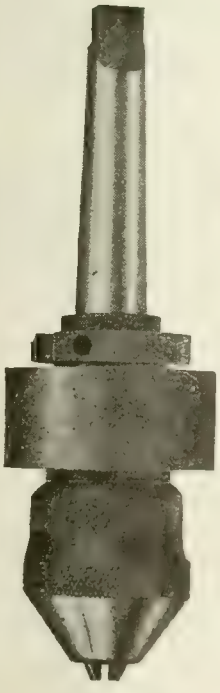
Get the details—In our Bulletin.
Write to-day.

BICKNELL - THOMAS CO.

GREENFIELD, MASS., U.S.A.

CANADIAN REPRESENTATIVE - THE JAS. BUCKLEY CO., ST. NICHOLAS BLDG., MONTREAL, P.Q.

Another Broken Tap!



Same old story: tap running at high speed—meets hard spot in metal—strain too much for tap—*snap*—get a new tap. Happens every day unless you use

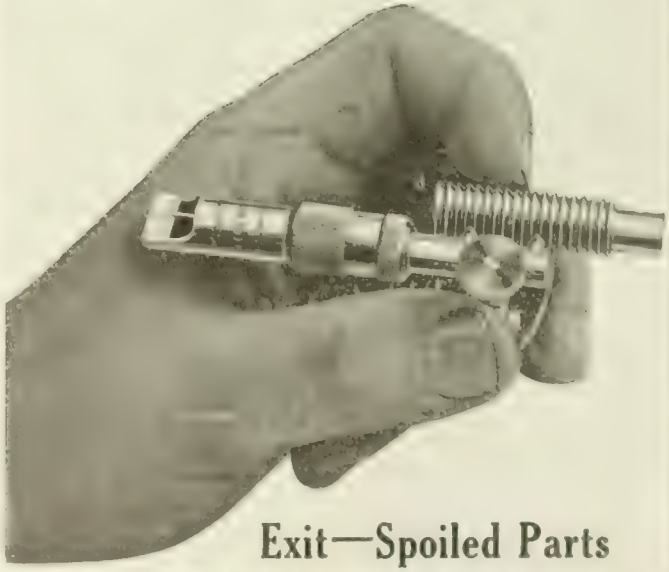
Bicknell -Thomas Friction Chucks

The instant the tap binds with a "B-T" the friction grip holding the tap slips, relieving overstrain, and prevents tap twist or breakage.

Compact; used on multiple-spindle drills and many other machines. Five sizes [illegible] either straight or Morse Taper Shanks.

How would you like to try one?

B-T THREAD LEAD INDICATOR



Exit—Spoiled Parts

[illegible] Were you ever forced [illegible] a thread a part over again, because it didn't fit as it should?

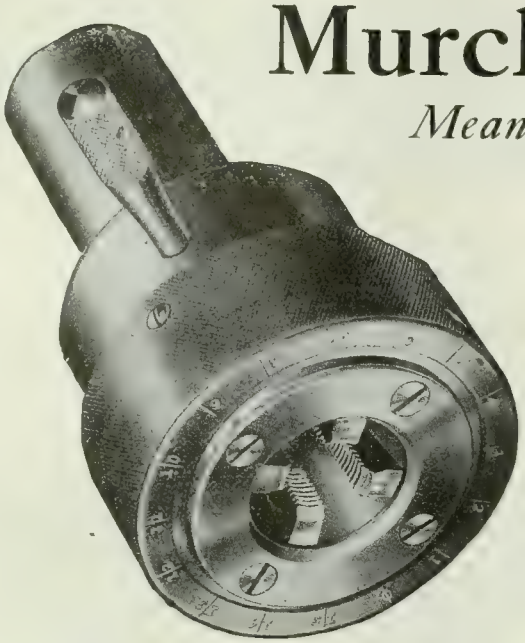
B-T THREAD INDICATORS

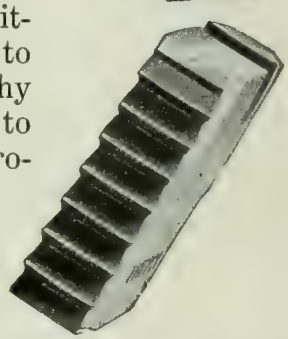
[illegible] enable you to get the right thread lead instantly and maintain a constant check upon it. They are [illegible] of any make can be used for testing odd and even pitches, [illegible] and external threads.

SEND FOR OUR BOOKLET.

Murchey Chasers

Mean Quick Deliveries





Murchey Tools will cut your tapping and threading costs. **They will boost production 50%.** Another important feature is Murchey's **Quick Deliveries on Chasers.** This is a Murchey specialty. No waiting! We get your chasers to you when you want them. Why not use Murchey Tools to speed up your threading production?

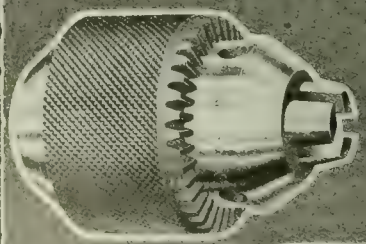
Send for a Murchey Tap or Die on approval and give it a trial. You will then secure actual proof of its value to you.

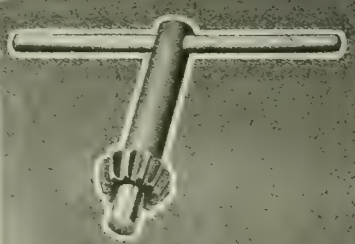
Murchey Machine & Tool Company, Detroit, Mich.

THE COATS MACHINE TOOL CO., Caxton House, Westminster, London, England, Glasgow, Newcastle-on-Tyne.
FENWICK FRERES AND CO., 15 Rue Fenelon, Paris, France.

Jacobs IMPROVED DRILL CHUCK

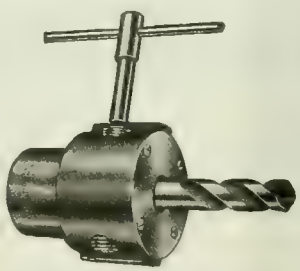
World Famous





The secret of their success is no secret at all. It merely does Superwork

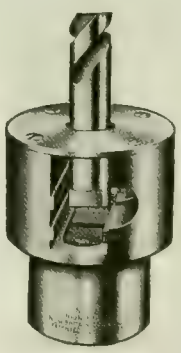
JACOBS MFG. CO.
HARTFORD CONN.
U. S. A.



UNION

POSITIVE DRIVE DRILL CHUCKS

The Union Drill Chuck is made in seven sizes (0 to 2 inches) with PATENT TRANSVERSE SLOT—so that drills with tenons can be inserted (see illustration). The shank of drill should be squared on two sides to enter the TRANSVERSE SLOT, giving a positive rotation to the drill independently of the jaws, permitting the jaws to centre and align the drill accurately. The drill is held absolutely true and will not slip under the hardest strain. This type of chuck will be found to give the best results on all classes of work from HIGH SPEED drilling to the hard BLACKSMITH and GENERAL REPAIR work.

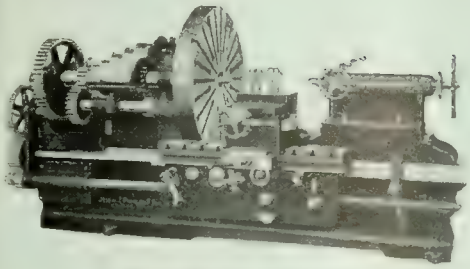


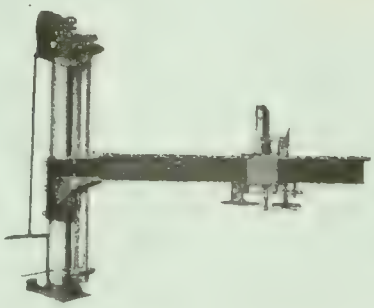
UNION Manufacturing Co.

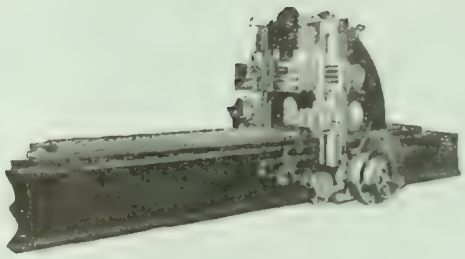
New Britain, Conn.

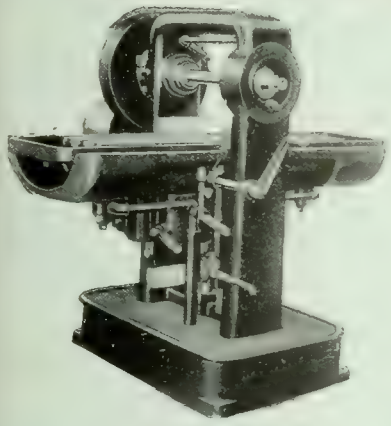
New York 26 Cortland St.

Makers of a complete line of chucks



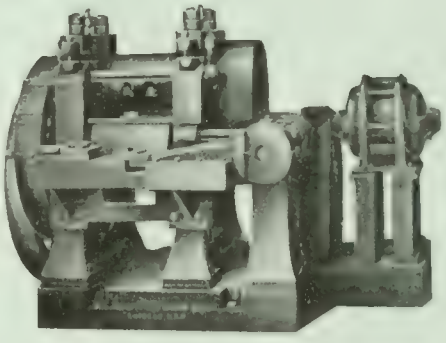


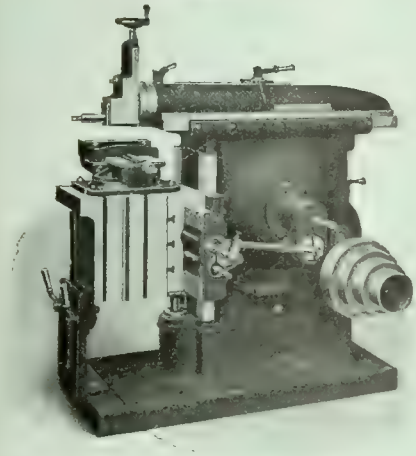


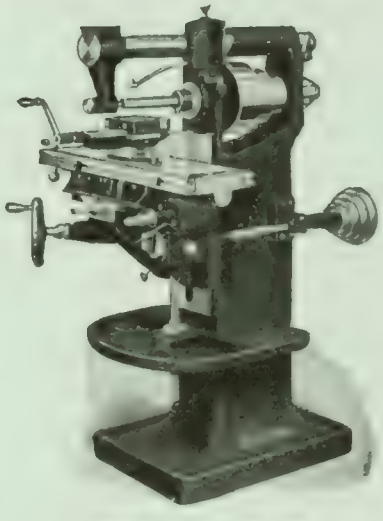


Metal Working Machinery

for any operation







IF YOU WANT

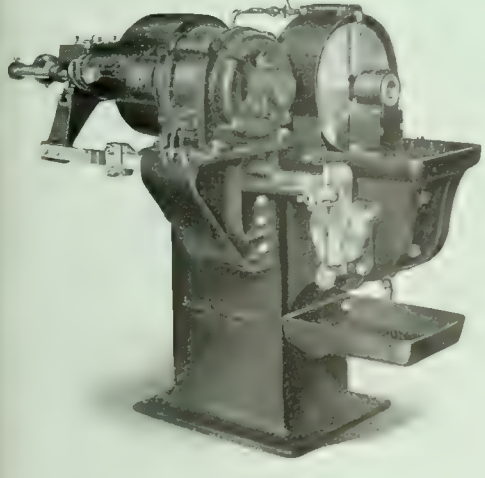
Machine Tools

NEW OR USED

Complete equipment for Boiler Shops, Structural Steel Works, Railroad Spring Shops, Flue Shops, or Machinery for any other purpose, or Woodworking Machinery of any kind

Get Our Quotations

Illustrations show a few of our machines for immediate shipment

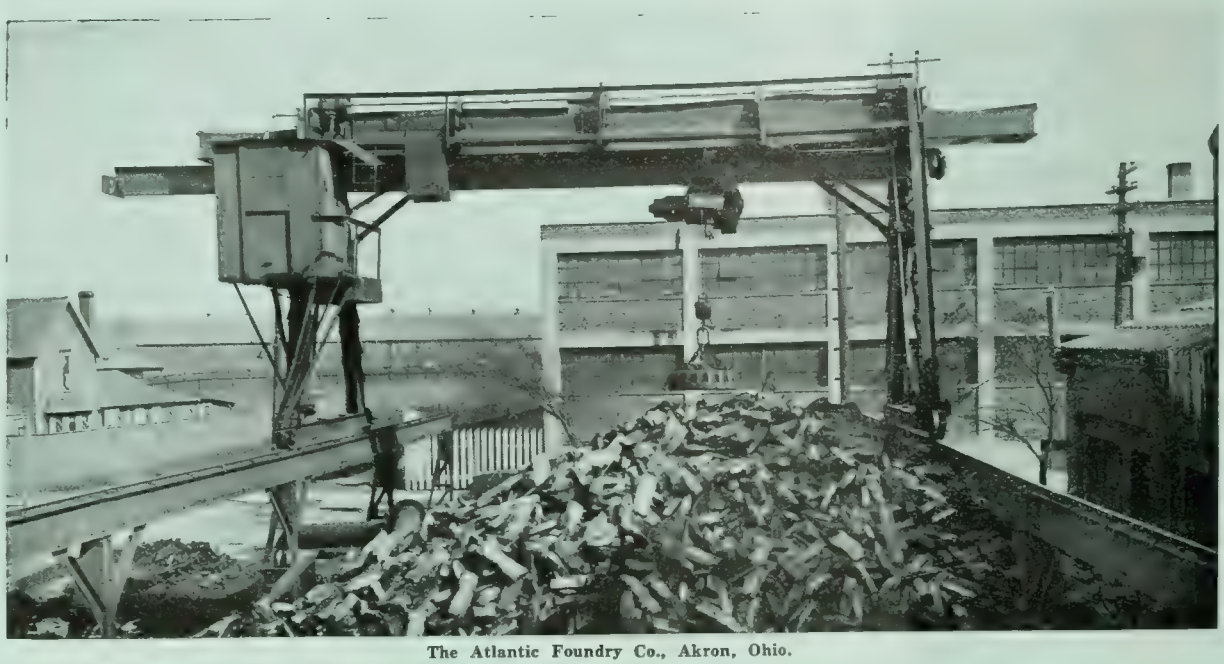


Garlock-Walker Machinery Company, Limited

32 Front Street West,

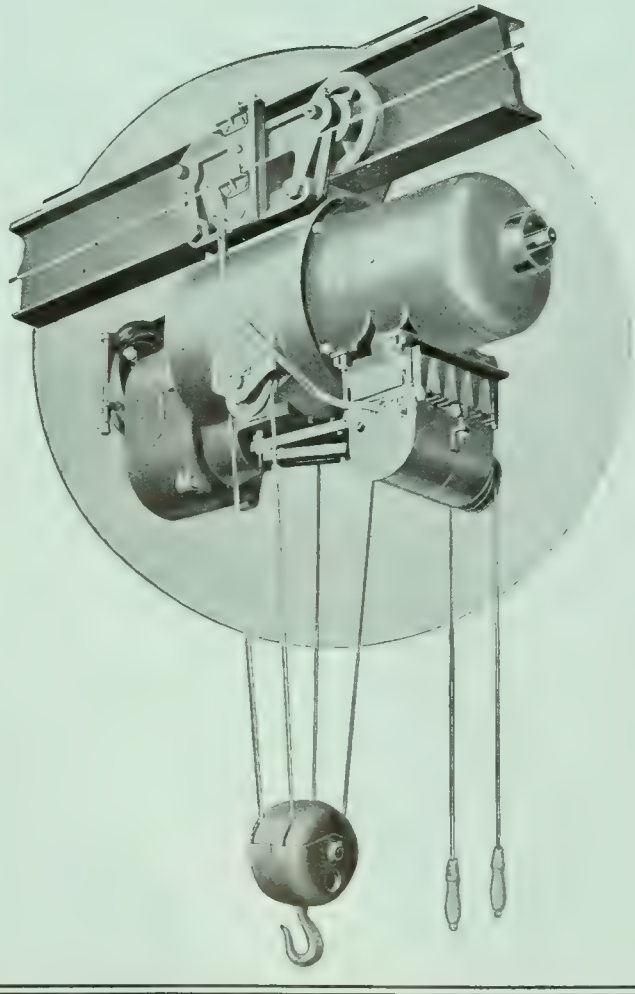
MONTREAL TORONTO WINNIPEG

"Everything in Woodworking and Metal Working Machinery"



The Atlantic Foundry Co., Akron, Ohio.

"AMERICAN" ELECTRIC HOISTS AND CRANES



Standard Electric Travelling Cranes, Wall, Jib and Gantry Cranes, and Mono-rail Systems to meet every requirement.

Special Features:

Totally enclosed motors and gears, heat treated gears, hardened shafts, and Hyatt roller bearings.

If standard equipment does not meet your requirements, we will build a special one that will.

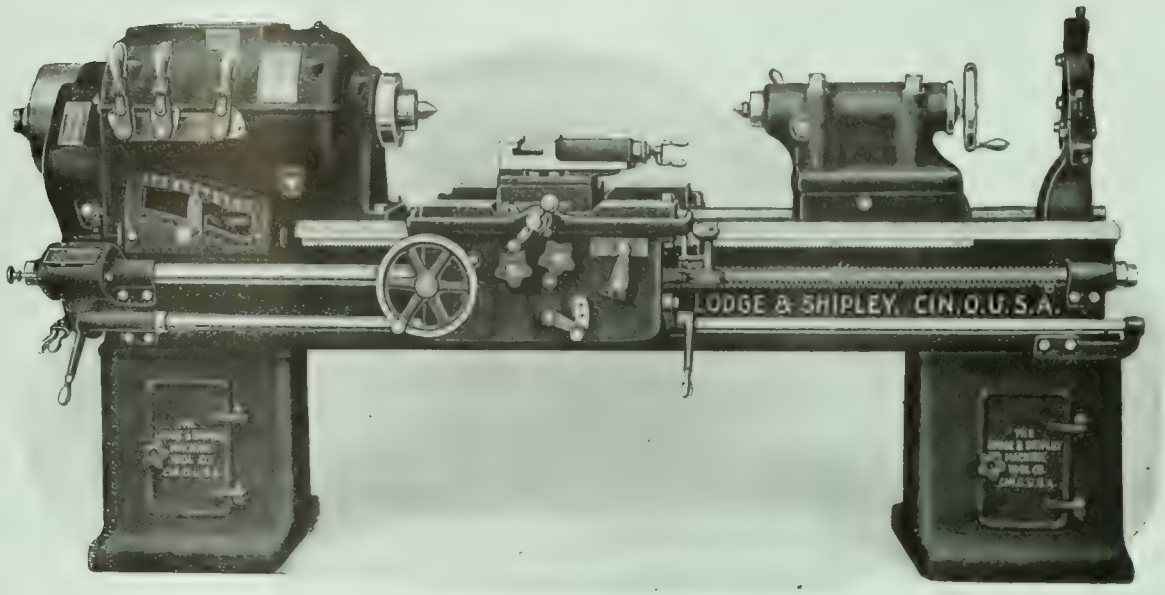
May we submit an estimate covering your requirements.

The Barber-Foster Engineering Co.
602-3 Swetland Bldg. Cleveland, Ohio
New York Pittsburgh Atlanta Detroit San Francisco

Canadian Sales Agents

Garlock-Walker Machinery Company, Limited
32 FRONT ST. WEST
MONTREAL TORONTO WINNIPEG

LODGE & SHIPLEY LATHES



The LODGE & SHIPLEY Lathe is well engineered and well built—each unit designed to insure long life and service, with economy and efficiency in operation. LATHE BUYERS: The name LODGE & SHIPLEY has always stood for the best in lathes—the positive vouched-for dependability of the LODGE & SHIPLEY Lathe, and also for the years of experience in lathe building.

"LATHES—GOOD LATHES ONLY"

The best reasons for equipping a plant with LODGE & SHIPLEY Lathes are because of their—

Power and Rigidity
Uniform and Permanent Alignment
Convenience of Operation
Unusually Efficient and Economical Service.

They will bring these advantages to your shop.

Write for complete information and Catalogue

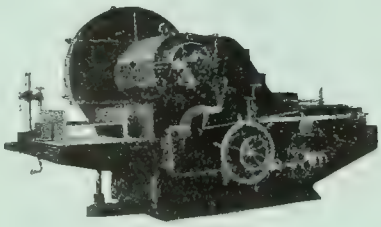
Garlock-Walker Machinery Company, Limited

32 Front Street West,

MONTREAL TORONTO WINNIPEG

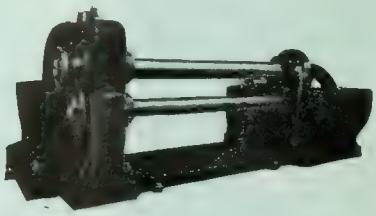
"Everything in Woodworking and Metal Working Machinery"

Machine Tools and Metal Working Machinery



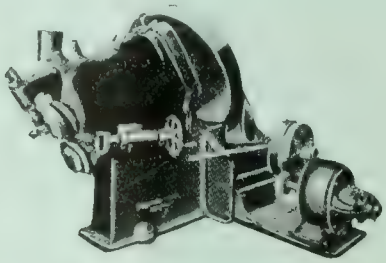
No. 4 High Speed Friction Saw

The Ryerson High Speed Friction Saw is designed for rapid cutting of steel shapes of all kinds. It is made in various sizes with capacity up to largest section rolled.



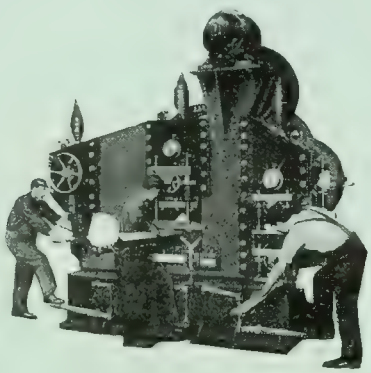
Lennox Double Housing Rotary Splitting Shear

This machine is designed for straight shearing of sheets and plates up to 1½" thick, and will cut through the center of a 20' plate. It will also shear round, square or flat bars.



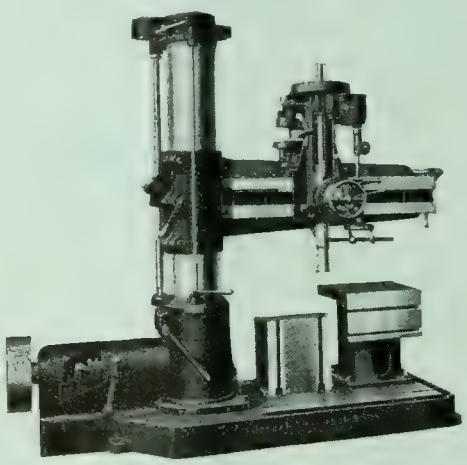
Lennox Rotary Bevel Shear

This is the most efficient machine now on the market for beveling irregular and curved sheets, boiler heads, flanges, dome sheets, plates, angles, etc. It is made in various sizes up to 1¼" capacity.

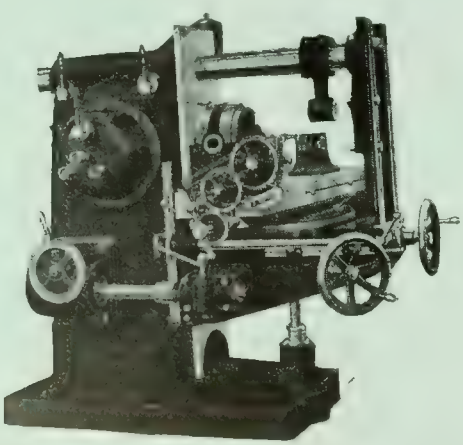


Ryerson Quintuple Combination Punching and Shearing Machine

These machines are built in different sizes and in various combinations for punching, plate, bar, angle and beam shearing, notching and coping work. It will handle this work without the necessity of interchanging attachments.



Ryerson 4" Plain Radial Drilling Machine

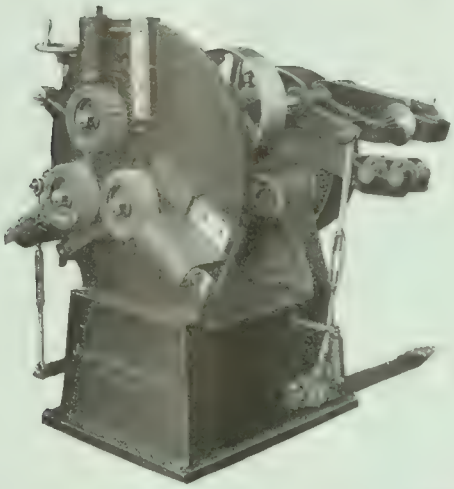


No. 3 Ryerson---Conradson High Power Single Pulley Drive Universal Milling Machine

GARLOCK-WALKER MACHINERY CO. LIMITED
G&W MACHINERY
TORONTO MONTREAL WINNIPEG
REPRESENTATIVES OF
JOSEPH T. RYERSON & SON
CHICAGO, ILLINOIS, U. S. A.
RYERSON SPECIAL MACHINERY AND MACHINE TOOLS.

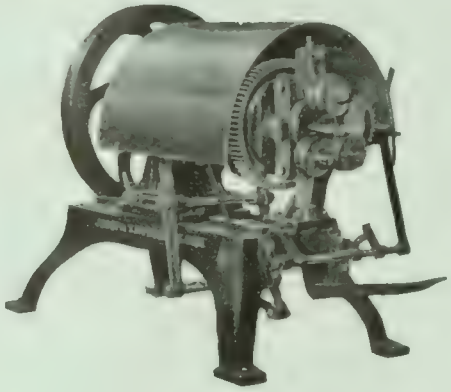
The Sign of Service

Flue Shop Machinery



Ryerson Improved Universal Flue Cleaning Machine

This machine will clean and cut tubes, both standard and superheater, up to 6" diameter.

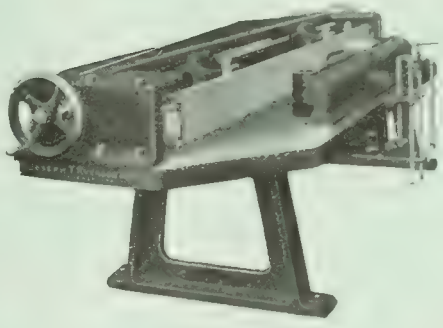


Hartz Flue Welding Machine

The Hartz Flue Welding Machine will handle either standard or superheater tubes with equal facility and economy. The tubes are welded on the roller principle and interchanging attachments can be furnished for the scarfing work.

Spring Shop Machinery

We can furnish complete equipment for cleaning and repairing boiler flues, and will furnish a layout to suit any shop conditions.

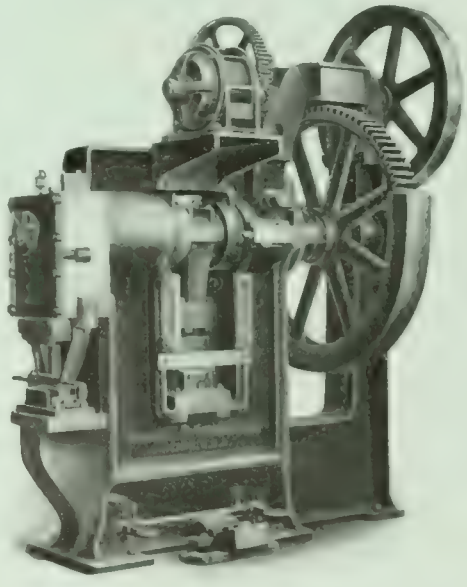


Ryerson Riegel Universal Elliptic Spring Forming Machine

This is the most improved type of Spring Former now on the market.

This Combined Shearing and Hot Punching Machine is designed for cold shearing spring stock and for hot punching slots for inside hangers as well as notching outside hangers.

We can furnish a complete line of spring shop machinery and will furnish plans and layout of a modern spring shop upon request.



Combined Shearing and Hot Punching Machine

GARLOCK-WALKER MACHINERY CO.
TORONTO MONTREAL WINNIPEG
REPRESENTATIVES OF
JOSEPH T. RYERSON & SON
CHICAGO, ILLINOIS, U. S. A.
RYERSON SPECIAL MACHINERY
AND MACHINE TOOLS

The Sign of Service

Write for Complete Descriptive Bulletins and Prices

Compare these Specifications:

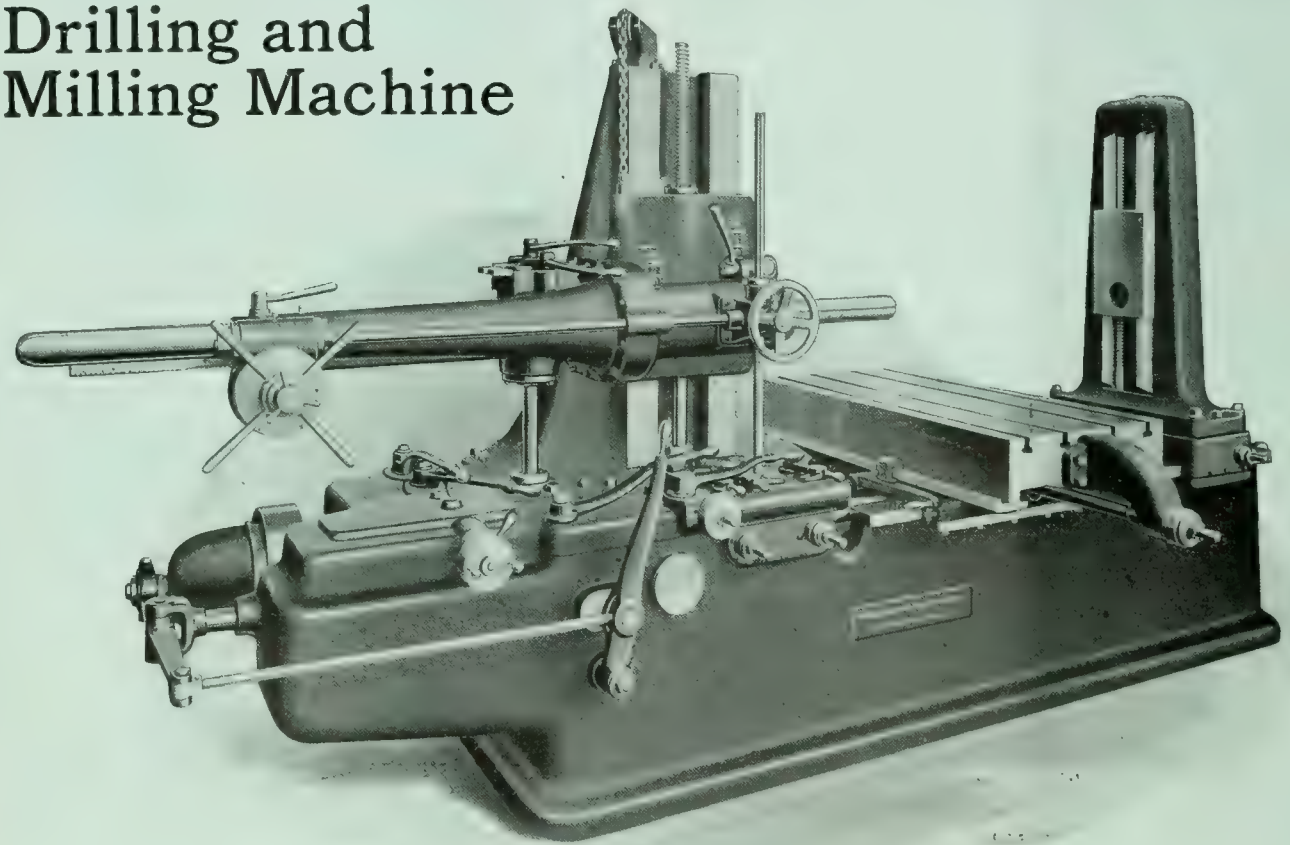
No. Machine	1
Diameter of Spindle	3⅛"
Travel of Spindle	30"
Spindle bored Morse Taper No.	5
Number of spindle speed changes	12
Ranges of spindle speeds in R.P.M.	16 to 196
Number of feed changes to spindle or table	9
Number of feed changes to spindle or table with back gears	18
Ranges of feed in inches per each revolution of spindle	.003" to .518"
Working surface of table	24" x 54"
Automatic longitudinal feed to table	36"
Automatic transverse feed or parallel movement of table with bed	37"
Maximum distance spindle nose to outboard bearing	5' 6"
Maximum distance top of plain working table to center of spindle	28"
Miximum distance top of bed to top of table	10"
Diameter constant speed friction drive pulley	14"
Width of driving belt	4"
Speed of friction driving pulley (revolution per min.)	350

Weight crated domestic shipment (standard length) approx..... 11600 lbs
Weight extra length of bed ..... 1000 lbs.
Weight boxed for sea shipment (Approximate) ..... 14000 lbs
H. P. motor recommended..... 5
Speed constant from 900 to 1200.

We prefer these standard motor speeds to obtain proper speed and feed ratios.

Other attachments such as circular swiveling table, auxiliary table, star feed and inserted tooth face milling cutters are furnished as extras.

The New "B.-E." Horizontal, Boring, Drilling and Milling Machine



The* Horizontal *Mill and Drill with the highest working efficiency. Note the one-piece deep base of a box pattern strengthening the bed where the greatest stress and strain exist.

Spindle Saddle is designed with a liberal surface on the face of the column, a long, narrow guiding edge, with single screw adjustable taper gib, for adjustments on one side and a square lock form with gib on the other side. This construction will always maintain and insure a perfect alignment for the spindle saddle.

CONVENIENCE AND SAFETY

is provided for the operator by placing all of the controlling levers to the front of the machine and high enough so he has no occasion to stoop or reach beyond that of his normal working position.

Garlock-Walker Machinery Company, Limited

32 Front Street, West

MONTREAL TORONTO WINNIPEG

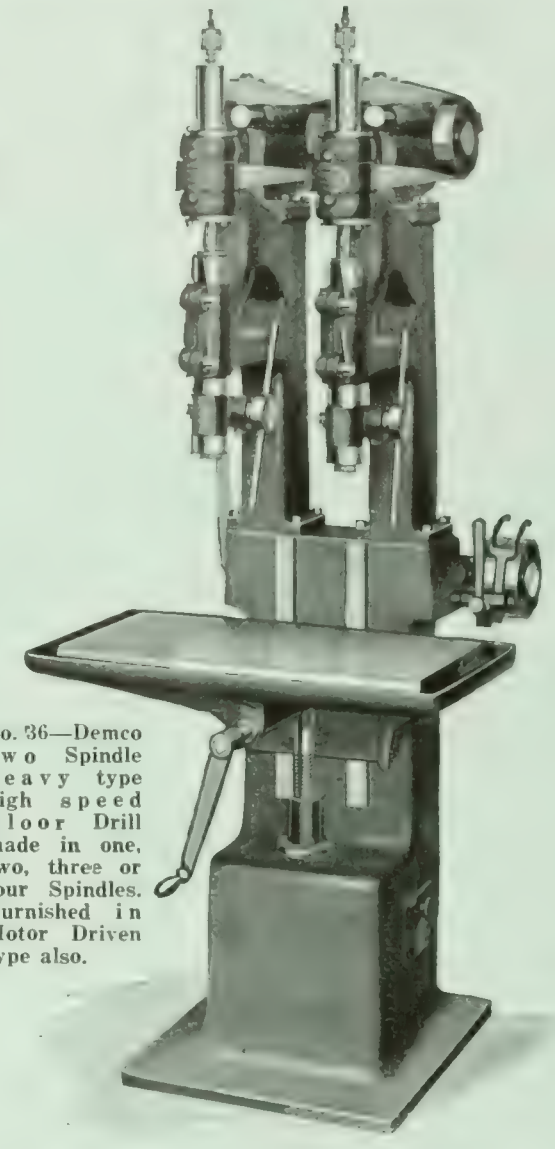
Noteworthy Features of

Demco
High Speed Ball Bearing
Drills

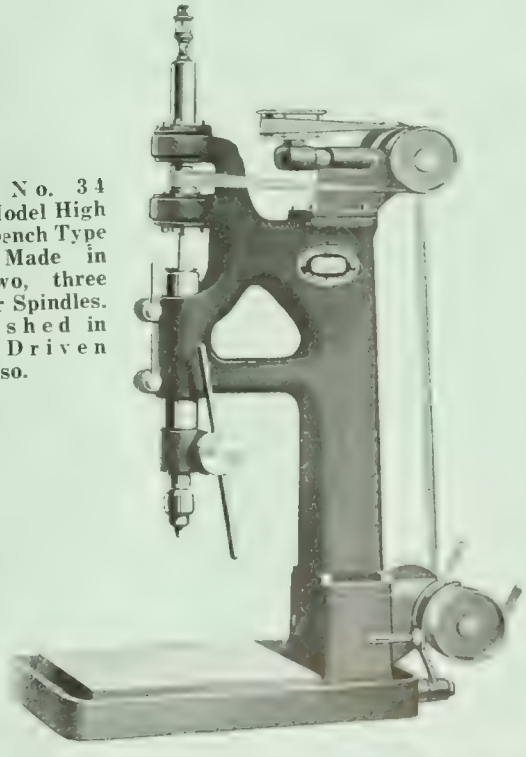
ALL moving parts are perfectly balanced and equipped with "Norma" Annular Ball Bearings, while a special automatic belt take up is provided to keep the belt in contact with pulley at all times.

The lack of vibration obtained by this design permits operating at a maximum speed of 12,000 R.P.M. This high speed avoids the necessity of unduly forcing the drill into the material and reduces drill breakage to a minimum.

Bench and Floor drills are made with 1, 2, 3 or 4 spindles. Choice of four different types of spindles is also provided.



No. 36—Demco two Spindle heavy type high speed Floor Drill made in one, two, three or four Spindles. Furnished in Motor Driven type also.



Demco No. 34 heavy Model High Speed Bench Type Drill. Made in one, two, three and four Spindles. Furnished in Motor Driven Type also.

THESE drills are made with the countershaft at right angles to the spindle arm and they are particularly adapted for driving by belt from overhead lineshafts.

They have the same characteristics and improvements as all other Heavy Type Demco Drills and are equally capable of producing a large volume of exceptionally high class work.

Garlock-Walker Machinery Company, Limited

32 Front Street West,
TORONTO

MONTREAL WINNIPEG

"Everything in Woodworking and Metal Working Machinery"

BRIGGS

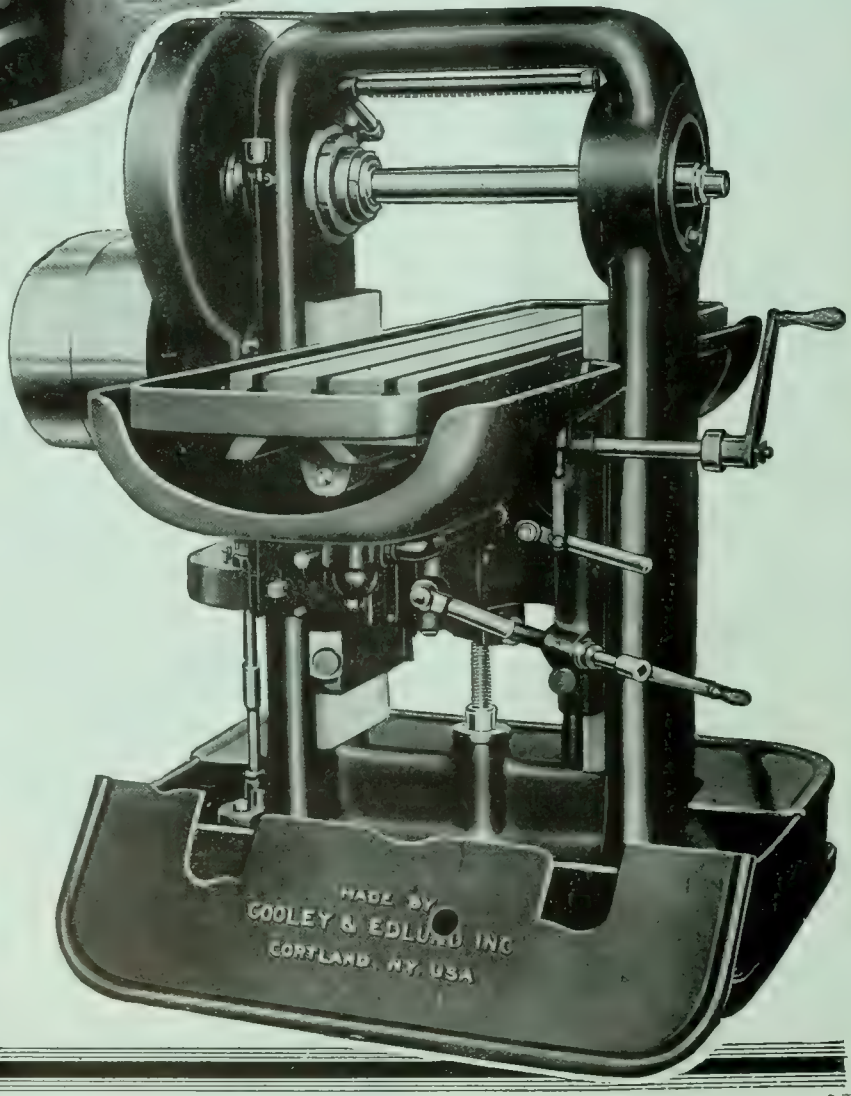
MILLER

Breaking Production Records

Forcing the feed on the "BRIGGS" to an extent impossible on any other machine.

THE photograph shows twelve belt lacer jaws clamped together on the table of a Briggs Milling Machine, where two straddle-mounted cutters mill the channels at one setting, though the stock is cold rolled steel, one inch thick. 15 minutes completes the operation, this speed being attained by forcing the feed to an extent impossible with any other milling machine. There is no chatter—the surface is "finished" when it comes from the machine.

Rigid, powerful and easy to operate. Takes wide, deep cuts without showing least signs of distress, and will produce accurate work when running at a high rate of speed.

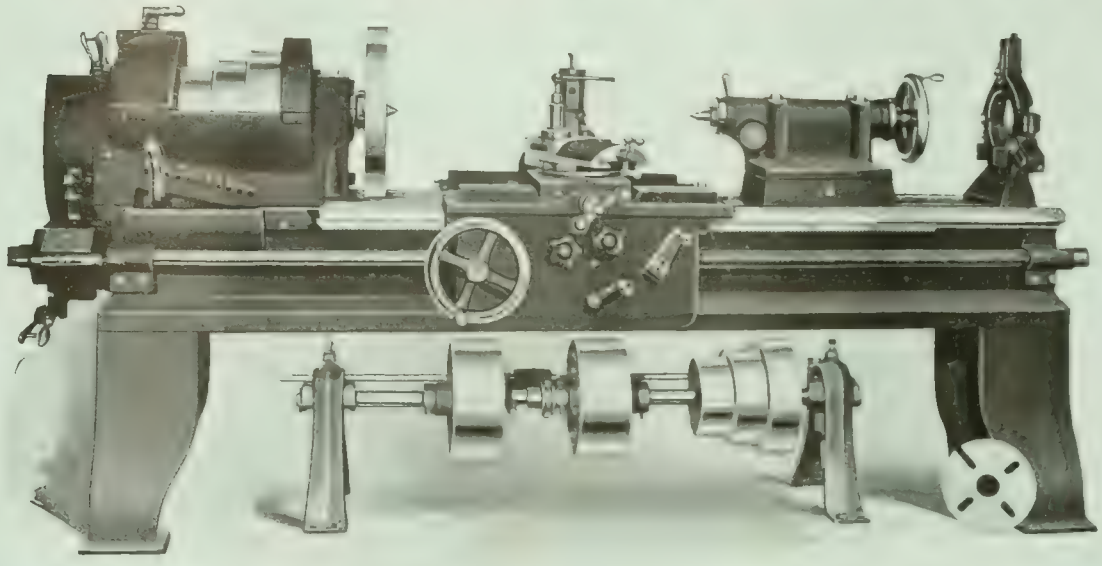


Gooley & Edlund, Inc.
Cortland, N.Y., U.S.A.

Representatives

Garlock-Walker Machinery Co.
32 Front St. W. -- TORONTO

RAE LATHES AND SHAPERS



18-in. QUICK CHANGE D.B.G. LATHE

Special large spindle bearings and webbed headstock insures rigidity and permanent alignment. It will stand up, stay fit at the lowest maintenance cost.

DIMENSIONS

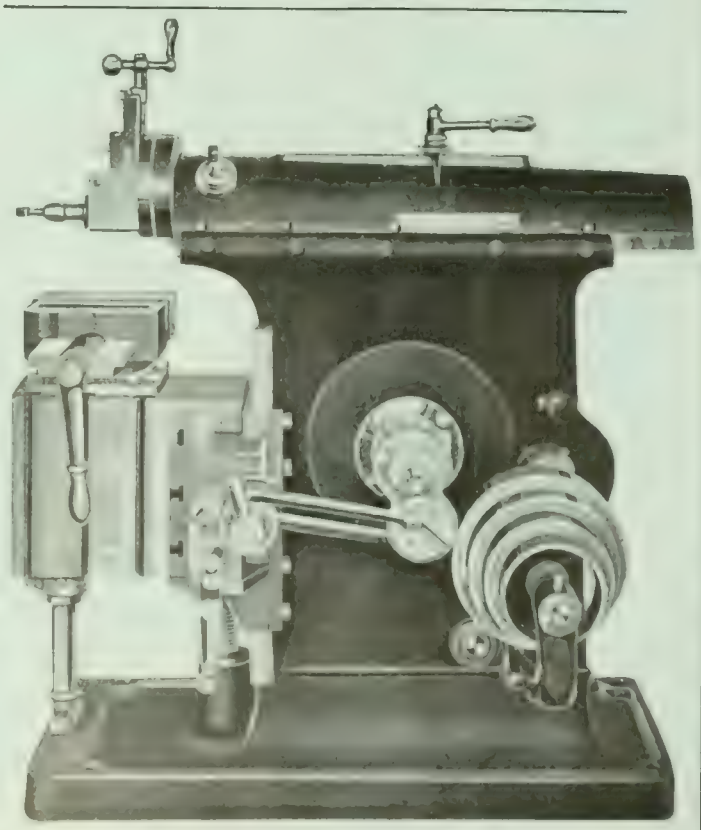
Swing-over Shears, 19½"
Width of Belt, 3"
1st Back Gear Ratio 3.26 to 1
2nd Back Gear Ratio 10.36 to 1.
Front Spindle Bearing 3¼" x 5 9-16
Rear Spindle Bearing 2⅞ x 3 13-16
Hole through Spindle 1 9-16
Cone Pulley Diameters 12", 10", 8"
Countershaft Driving Pul 5" x 12"
Lead Screw Threads, per in 4
Beds and standard lengths.

Rae 16" Back Geared Crank Shaper

Actual stroke 18". Powerfully geared with eight speed changes.

These machines built by the Rae Machine Tool Works, Hamilton, Ont., will surely interest the many who prefer machines "Made in Canada."
Delivery from our Toronto warehouse.

Write for full particulars

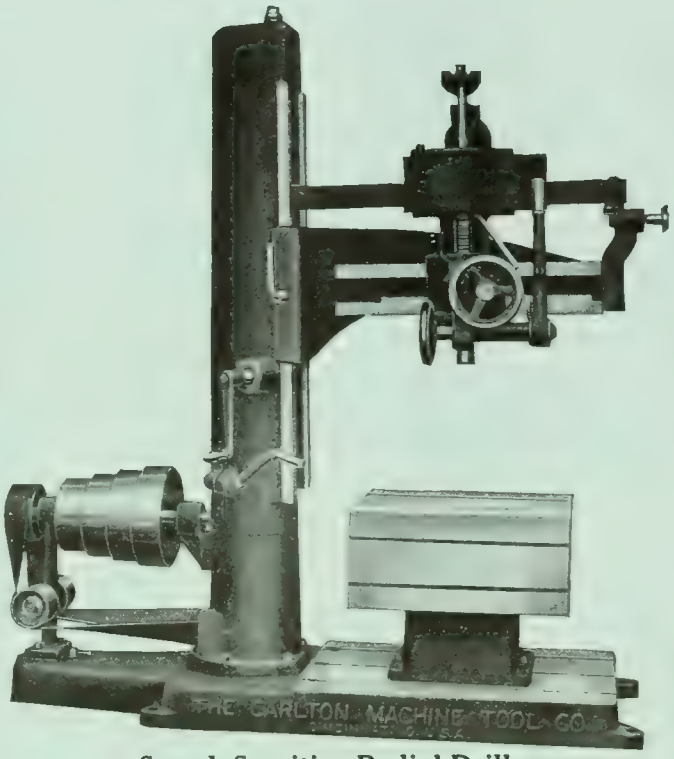


Garlock-Walker Machinery Company, Limited

32 Front St. West

Montreal TORONTO Winnipeg

CARLTON RADIAL DRILLS



Speed, Sensitive Radial Drill, 2½—3—3½—4 ft. sizes.

Sixty Seven Holes Drilled and Tapped in Twenty Minutes is "Going Some"

Holes are not all the same size either.

This is **day-in** and **day-out** production record on crank cases for the *Dayton Kelly Springfield* one ton truck.

The CARLTON MACHINE TOOL COMPANY'S Speedy, Sensitive Radial Drill handles this kind of work for the majority of Canadian and American manufacturers at a profit. It will do the same for YOU. It is a rapid, accurate producer with distinctive advantages for drilling up to 1 in. in steel.

Carlton manufactures RADIALS with CONE or GEAR BOX DRIVE with arms up to four foot swing.

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Garlock Walker Machinery Company, Limited

32 Front Street West

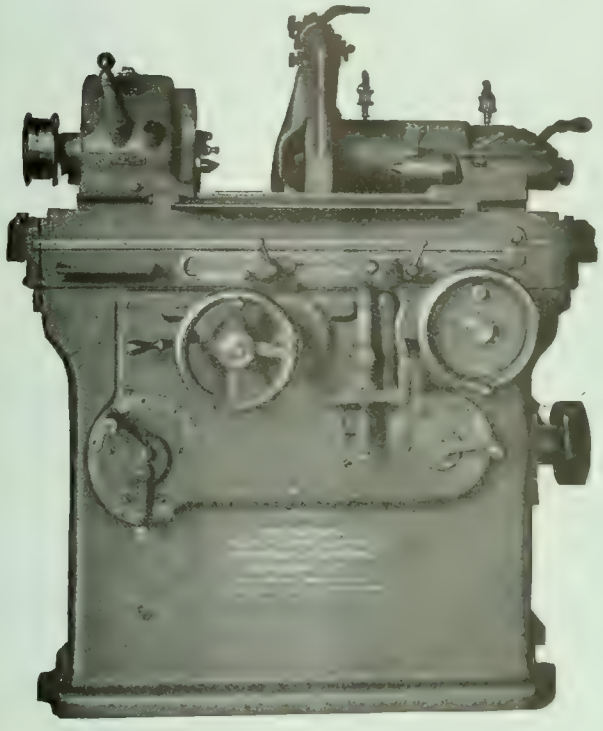
MONTREAL TORONTO WINNIPEG

"Everything in Wood-working and Metal-working Machinery"

FITCHBURG

PLAIN CYLINDRICAL GRINDING MACHINES

Model "A" 6" x 20"



Other Sizes

4" x 20"

8" x 36" 12" x 36"

8" x 54" 12" x 54"

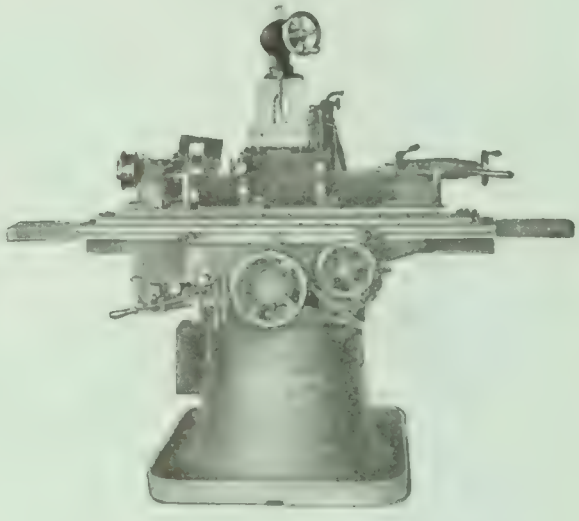
FITCHBURG GRINDING MCH. CO.

FITCHBURG, MASS., U.S.A.

BATH

UNIVERSAL GRINDING MACHINES

Adaptable to any Grinding Job



No. 1 10" x 20"
No. 2 10" x 25"
No. 2½ 10" x 36"

No. 2 and 2½ are furnished to order with 12" swing

BUILT BY

UNIVERSAL GRINDING MACHINE CO.

FITCHBURG, MASS., U.S.A.

You should have our descriptive catalogues on these grinders

SEE THESE MACHINES AT OUR EXHIBIT AT THE CANADIAN NATIONAL EXHIBITION

GARLOCK-WALKER MACHINERY COMPANY LIMITED

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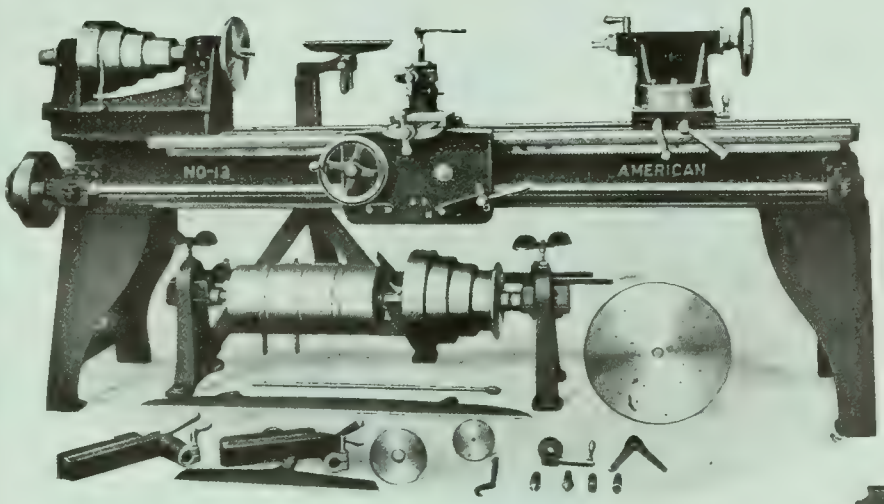
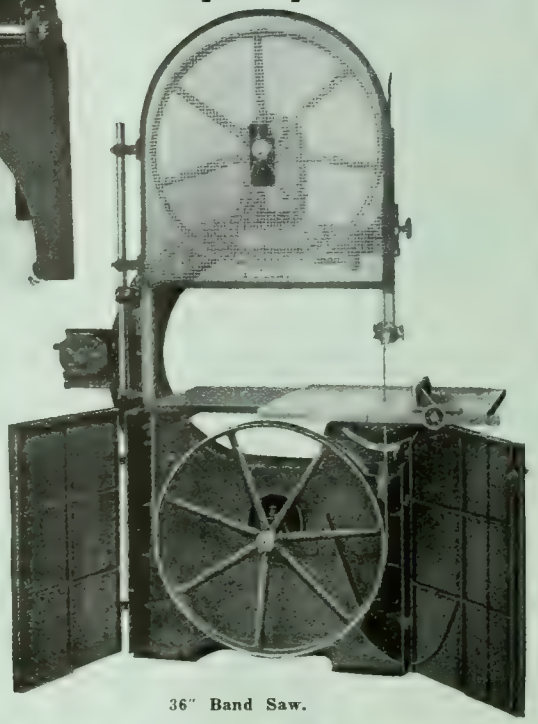
TORONTO

Montreal Winnipeg

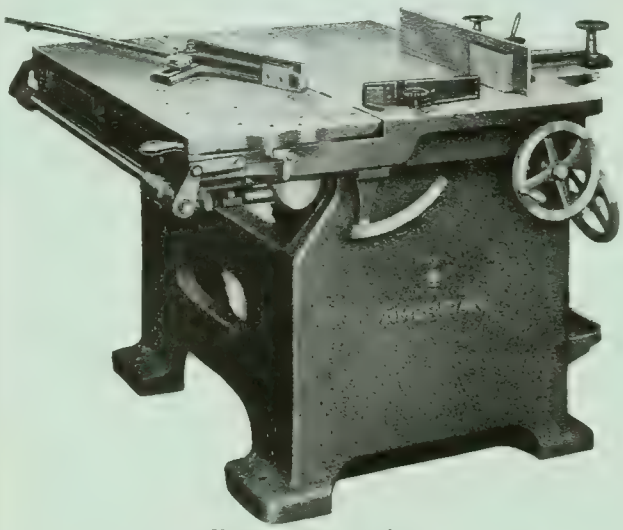
Pattern Shop Equipment



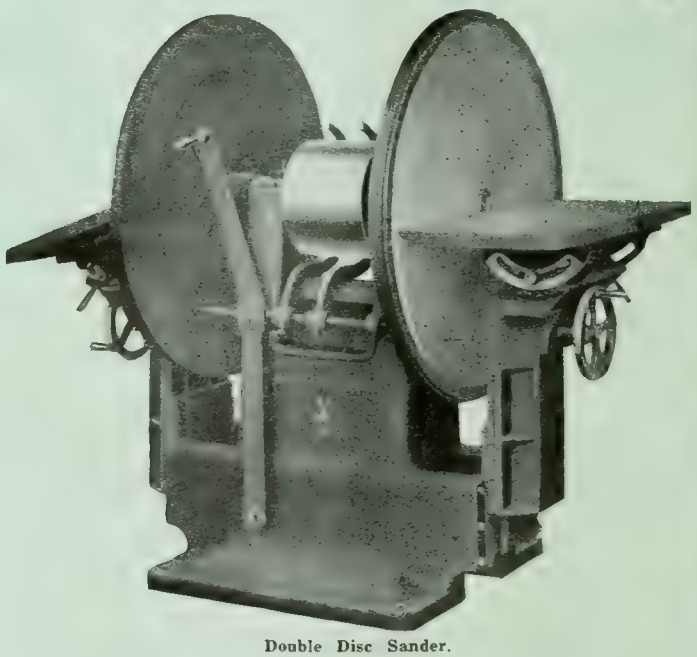
Pattern Makers' Lathe.



36" Band Saw.



Universal Saw Bench.



Double Disc Sander.

Bench Jointer.

A few Wood-Working Tools for Your Pattern Shop

Garlock-Walker Machinery Company, Limited

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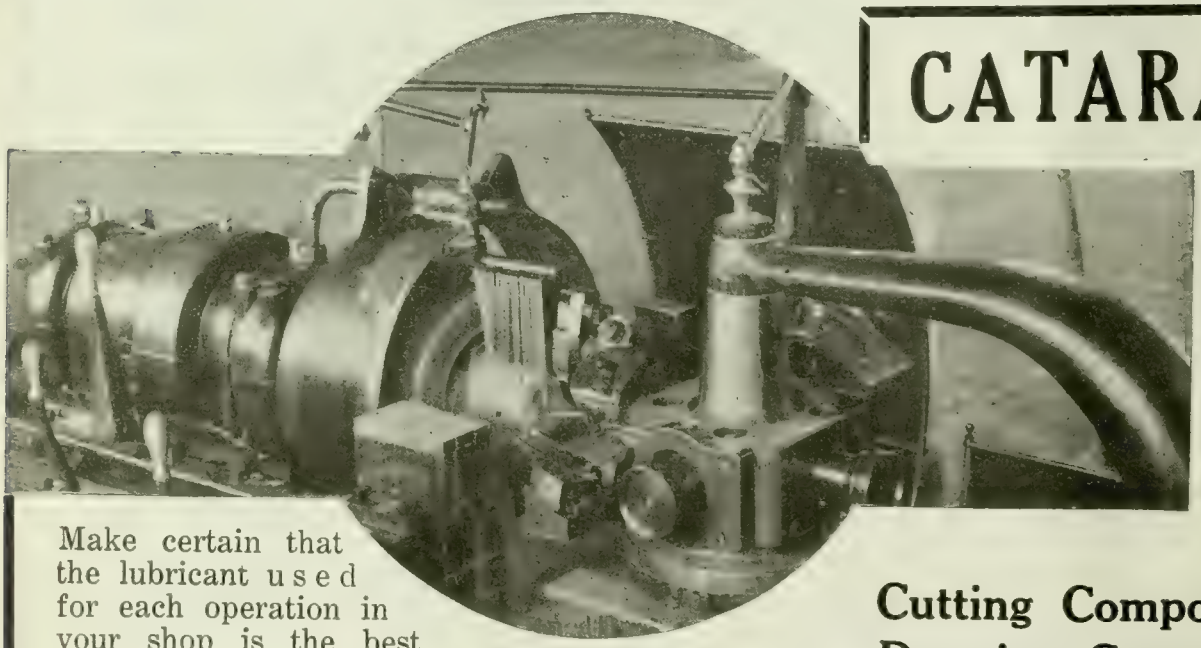
Standard Drill Sleeves
Use-em-up Drill Sleeves
Micrometers and Gauges
Combined Drills and Countersinks
Jacobs Drill Chucks

CATARACT



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Make certain that the lubricant used for each operation in your shop is the best obtainable for the purpose. Otherwise your men and your tools and your machines work at a disadvantage.

Write us to-day that we may demonstrate how Cataract Lubricants can increase production and reduce cost in your plant.

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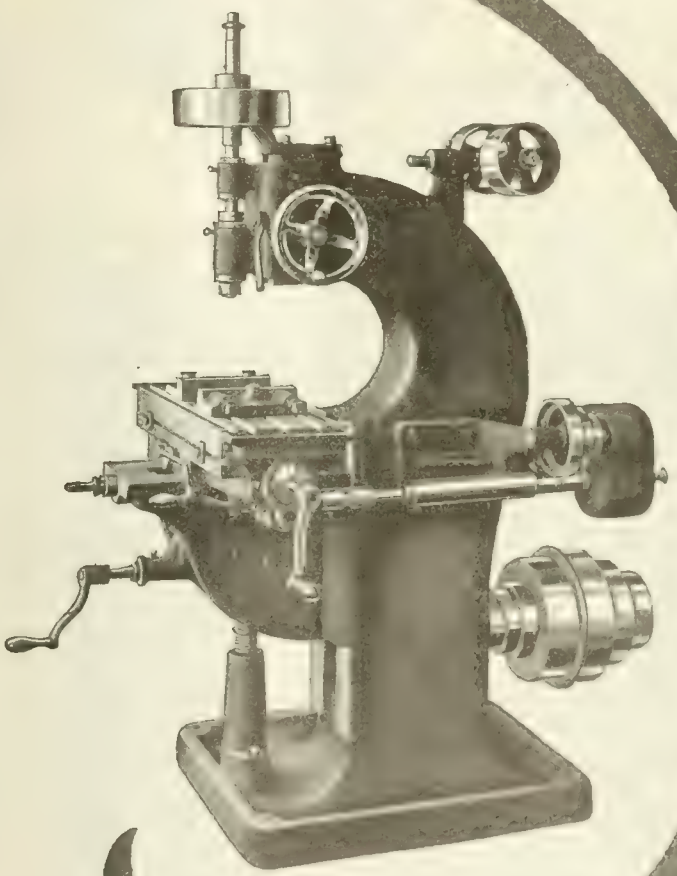
BRISTOOL

Bristol Vertical Milling Machine

A Tool of Large Capacity



Ball Bearings are used at the most important points making it a free running tool, which, combined with its being a belt-driven machine, makes it capable of turning out work on which an extra smooth finish is desired.

The longitudinal table feed is controlled by the gear change box which gives six different feeds for each change of spindle speed. A stop to gauge with micrometer adjustment is used on the head to regulate the depth of cuts.

Learn all about its production capacity.

Write for bulletin giving fullest particulars.

BRISTOL MACHINE TOOL CO.
SUCCESSORS TO C. G. GARRIGUS MACH. CO.
BRISTOL, CONN.

"The Marshalltown Throatless Shears"

guarantees perfect work at less than half the ordinary expense.

Rotary, self-feeding shears designed for cutting in and out curves, straight or irregular shearing, circles, also beveling and splitting of plates. Built in various sizes having capacities from tin up to ½" thick. No limit to the size of sheet being cut. Hand, belt or motor drives. The last word in metal cutting shears. We also manufacture Rotary Bevel Shears, Splitting Shears and Plate Milling Machines.

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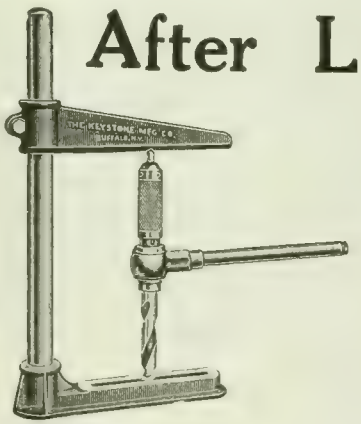
Marshalltown Mfg. Co.
Marshalltown, Iowa
U. S. A.

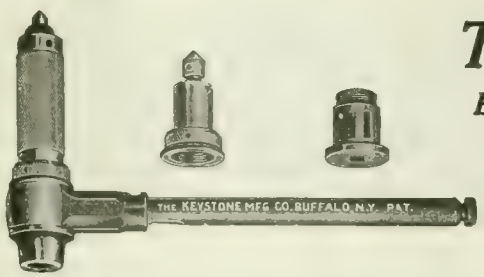
"Keystone Quality" Will Still be There After Long Use Has Worn Away The Name



We like to think of that.

We like to think that the reputation of Keystone Tools is built upon a foundation of service with **Quality** the Keystone rather than a copyrighted name. For it is conceivable that imitators, or even the whims of courts, might rob us of our copyrighted name. But who could take "Keystone Quality" from Keystone Tools?

Write for name of nearest dealer.



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Equipment of the "HISCO" Plant

Includes everything essential to the perfection of its product.

The plant is equipped with most up-to-date testing scales for hardness, as well as physical properties tests. Therefore, every heat of steel that is poured is subject to scientifical test.

The pattern department is capable of handling work to any specifications or blue prints.

Anything that can be cast in steel—describes the capacity of the Hisco Plant.

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Material used is not a matter of speculation. It is the product of the most up-to-date equipped plant in America operated under expert supervision of European and American steel makers.

Send your specifications or blue prints to a plant capable of the highest class workmanship.

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CRANES

Direct and Alternating Current
Capacities: 2 Tons to 200 Tons

BRIDGE CRANES for all purposes

Including Power House, Foundry, Shop, Steel Works and other uses

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REVOLVING TOWER CRANES

for Shipbuilding and Fitting-out Berths

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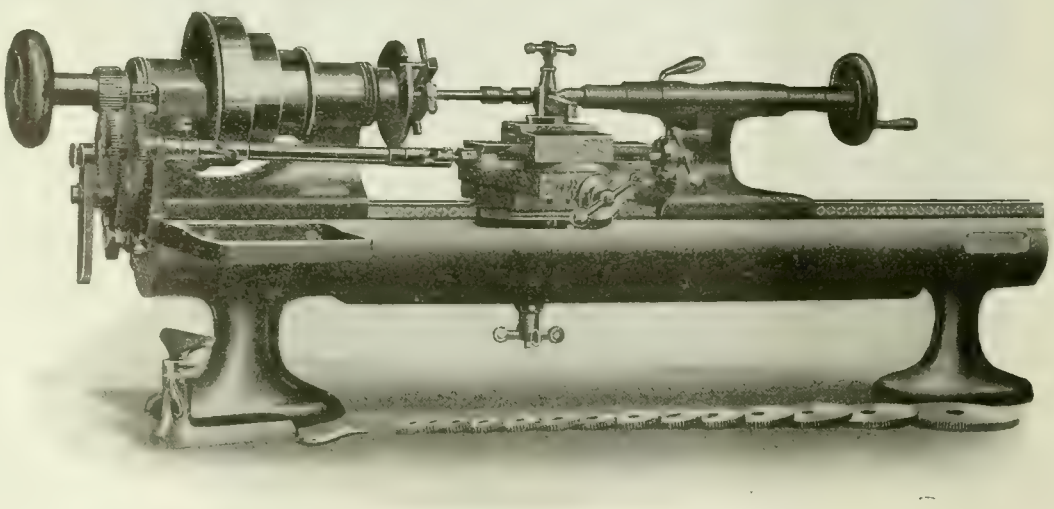
CATARACT BENCH LATHES AND ATTACHMENTS

Cataract Bench Lathes are finely constructed precision tools, with responsive controls, simple adjustments and numerous convenient attachments adapting them to a wide variety of work. **Study this illustration.** Note the base, the circular bed, the sliding tool post, massive head stock (indicating strength), range of gears, special tailstock, arrangement of gears.



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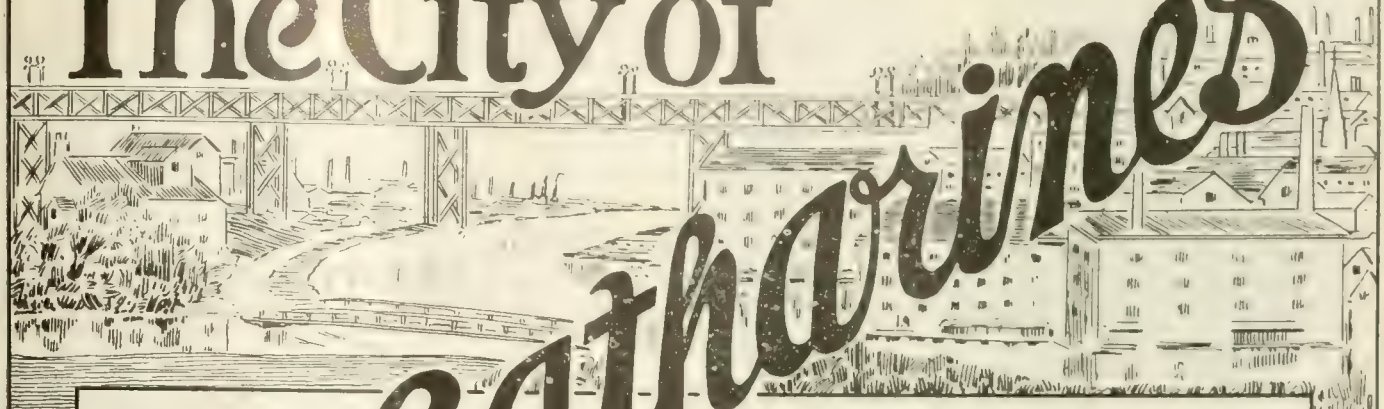
ALFRED HERBERT CO., Limited, Coventry, England, are our representatives for United Kingdom, France, Belgium, Russia, Japan, Manchuria, Korea, Formosa, China, Italy.

The City of St. Catharines



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Grand Trunk Railway and National Railways.

Boat connection with Great Lakes ports.

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About 60% of mechanics own their own homes.

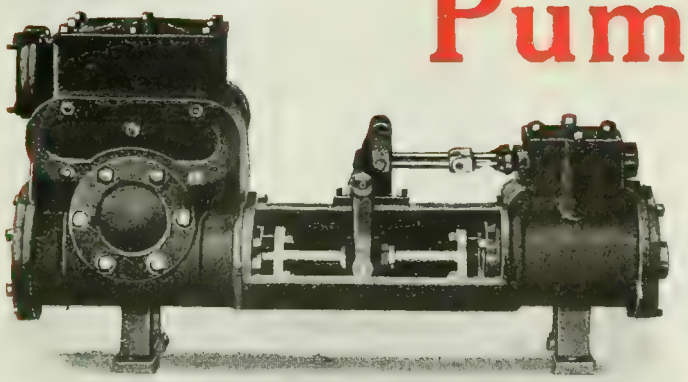
Ideal conditions for laborers.

Excellent schools. Over $160,000 being spent this year for new schools.

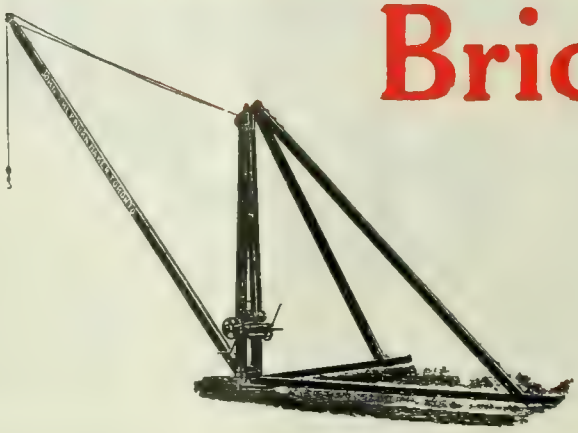
Complete details upon request. Write the Secretary, Board of Trade

St. Catharines, Ontario

Pumps, Planers, Grey Iron Contractors' Brick



Boiler Feed Pump With Cast Iron Stretcher Rigid and Efficient



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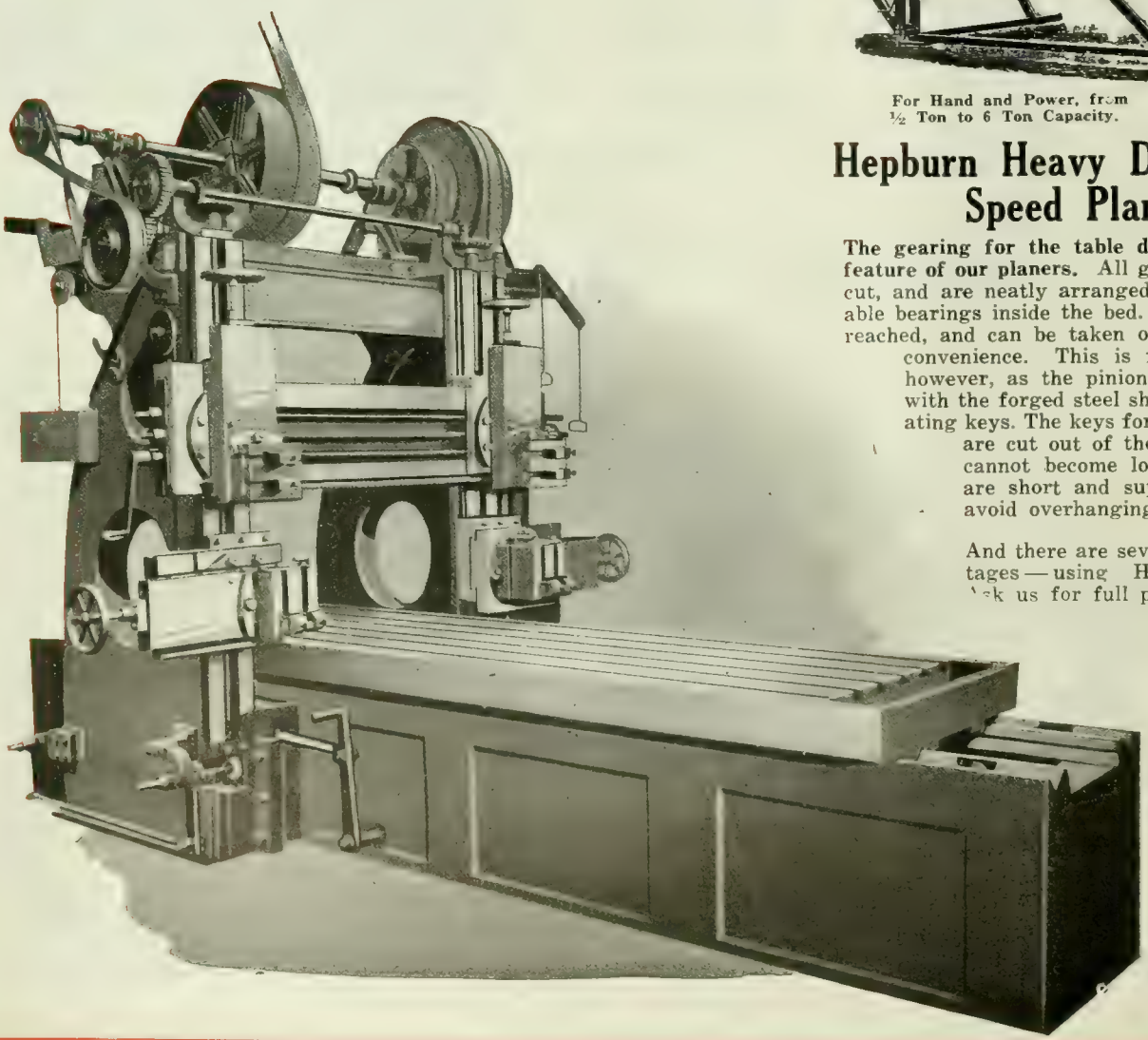

Hepburn Heavy Duty High Speed Planer

The gearing for the table drive is a special feature of our planers. All gears are machine cut, and are neatly arranged between removable bearings inside the bed. They are easily reached, and can be taken out with little inconvenience. This is rarely necessary, however, as the pinions are made solid with the forged steel shafts, thus eliminating keys. The keys for the large wheels are cut out of the solid shaft and cannot become loose. The shafts are short and supported so as to avoid overhanging.

And there are several other advantages — using Hepburn Planers. Ask us for full particulars.

Gear Cutting
Castings
Machinery
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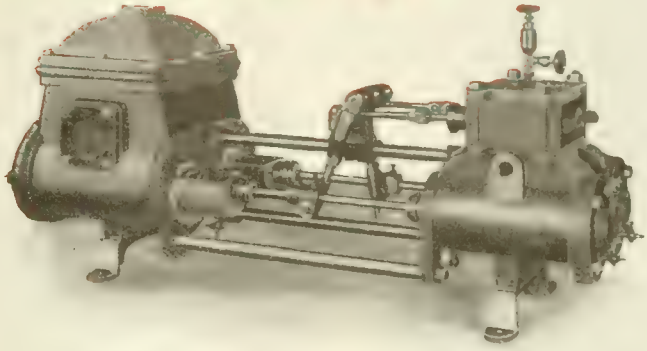
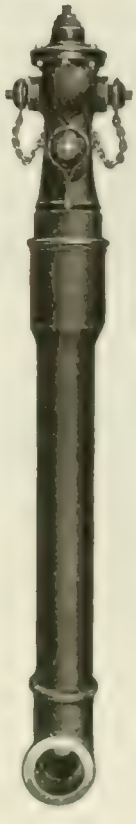
Electric Derricks, suitable for stone yards and quarries. Sizes up to 6 tons. Booms up to 70 feet long.



Duplex Boiler Feed Pumps. Write for Standard Sizes and Prices.

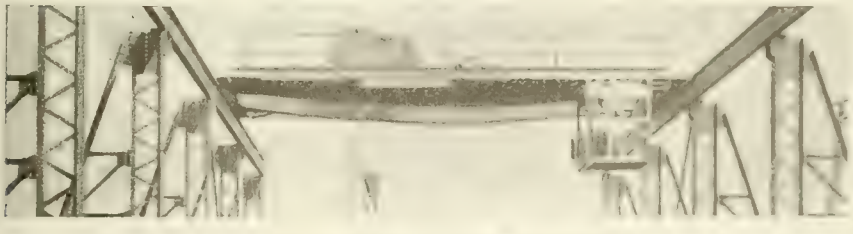
Hydrants

Made for City of Toronto and York Township.



Up-to-the-minute design and top-notch quality is our motto and our products show it. If you require anything in the above-mentioned lines, do not hesitate to write us for the fullest information.

All inquiries receive our prompt and careful attention.



Electric Overhead Cranes, up to 25 tons capacity.

Valves

Made for City of Toronto and York Township

JOHN T. HEPBURN, LIMITED

Engineers and Iron Founders

18-60 VAN HORNE STREET, TORONTO, ONT.

An actual photograph of Williams' Superior Wrenches taken from the height of the 57th story of the Woolworth Building, during construction; 750 feet above City Hall Park, New York City. Star in picture: Singer Building, 41 stories in height.

Williams' Superior Drop-Forged Wrenches

A BIG business, like a big building, requires a broad and sound foundation. For nearly half a century we have been designing and developing standard line of *Superior* Drop-Forged Wrenches. We now make and carry regularly 40 Patterns in about 1,000 sizes, with openings from 3/16 to 7⅝ inches, ready for prompt shipment—something *Standard* in design and size for every recognized trade need.

Our trade-marks, "Vulcan" and and "Agrippa," are known the world over wherever machinery or tools are used. They stand for *Superior* quality—the kind that guarantees service under the most severe conditions, for they represent our constant effort to maintain the high standard of excellence that has long been established for Williams' product.

Specify Williams' Wrenches or Tools when you order, and get *Superior* quality.

Wrench Booklet on request.

J. H. Williams & Co.

"The Drop-Forging People"

45 Richards Street, Brooklyn, N.Y.

THE A. G. LOW CO., LTD., 45 Pacific Ave., Saskatoon, Sask.
Agents for Manitoba, Saskatchewan, Alberta, British Columbia.

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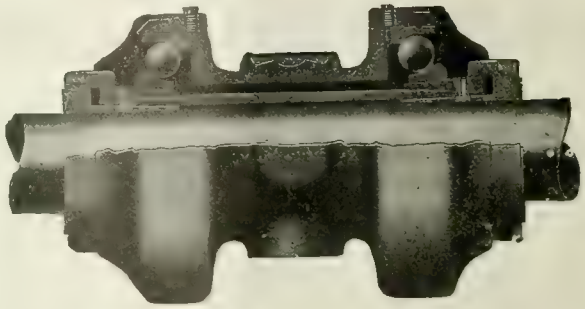

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A Time Tried and Proven Economy Bearing Primarily Built for Line Shafting

THE ESTEEM in which CHAPMAN DOUBLE BALL BEARINGS are held is born of a certain and intimate knowledge of their superiority in actual service and power saving ability, an estimation which is highest among over 4,000 plants using them.

A Few of the Many Well Known Plants Using Chapman Double Ball Bearings

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Goodyear Tire & Rubber Co.	Bowmanville, Ont.
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Chapman Double Ball Bearings are built so as to fit any hanger frame.
They reduce power costs 15% to 40%.
They are entirely drip proof.
They are dust and dirt proof.
Require lubrication once a year.
They increase production.

Send for Catalog No. 3-B and Proof

The Chapman Double Ball Bearing Co., Limited

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The Transmission Ball Bearing Co., Inc.
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Stands for Quality

HIGH Grade **Steel Castings** of every description. Put our quality and service to the test and you'll be convinced that we offer the best.

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Wearing parts for Gyratory Crushers, Dredger Pins and Bushes, etc., etc.

All Alloy Steel Castings.

Write for prices and particulars.

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ELECTRODE WINCHES

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FOR SMELTING FERRO ALLOYS AND REFINING STEEL

PORTABLE ELECTRIC HOISTS,

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-And I Always Thought That Was A Good Tractor-

Some little part gave way and his Spring plowing was delayed for a couple of days. His good opinion of your tractor is gone forever; others will hear his tale and your distributor in that territory will fall two or three short of selling as many of your tractors as he would have sold if it hadn't been for that defective part, defective because it was improperly heat-treated.

It makes no difference whether you manufacture tractors or other machines or machine parts, unless you have the **right** heat-treating furnace the reputation of your product is in constant jeopardy.

You Cannot Afford to Take Such Chances

GILBERT & BARKER Heat-Treating Furnaces

insure uniform high quality of produce because they are designed right and built right. The combustion in a G. & B. Furnace is 100% efficient, temperature control is one of the big features, the heat is uniform always, the result is a finished product of maximum tensile strength which will stand up under the hardest usage.

The operating cost of G. & B. Furnaces is extremely low.

Send for Bulletin 24. Let our Engineers suggest the furnace that is best suited to your requirements.

To-day is a better day than to-morrow—write.

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New York Office: 26 Broadway

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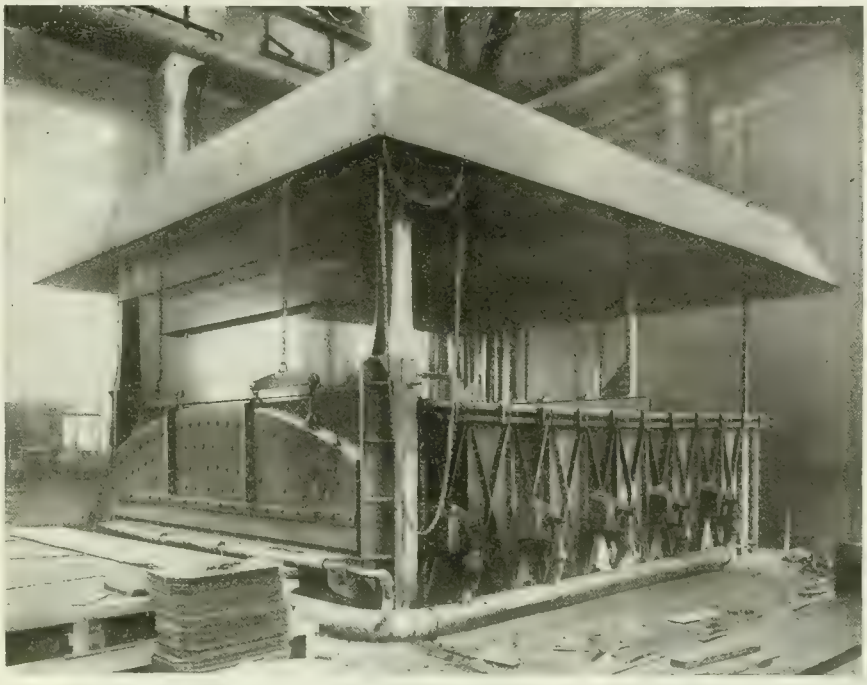

Any Size

Illustration shows a Plate Heating Furnace installed in the plant of Canadian Vickers Ltd., Montreal.

Your proposition, if out of the ordinary, would be bettered by our co-operation. Get in touch with us.

Mechanical Engineering Co., Ltd.

Room 308, Bank of Toronto Bldg., Montreal

Three Rivers, Que., Canada

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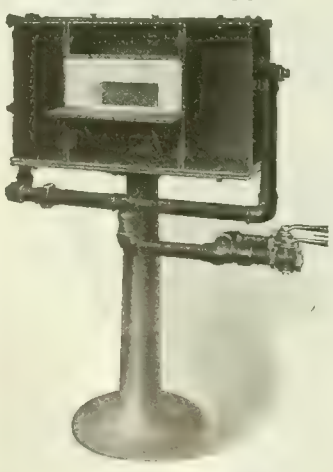
OIL or GAS

Prompt delivery on all tool room types



Cutting Tool Furnace

For

Annealing
Carbonizing
Hardening
High Speed Steel
Lead and Salt
Oil Tempering
Forging
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Furnaces built for special requirements

STANDARD FUEL ENGINEERING CO.
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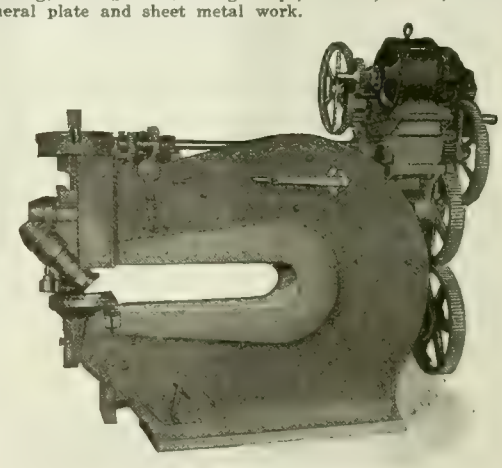
H. COLLIER SMITH
"QUICKWORK"
Registered U.S. Patent Office

ROTARY SHEARS

Made in 6 Sizes

Cut all gauges of sheet and plate metal up to 1 inch thick in straight or irregular shapes and openings without cutting in from side of sheet. Leaves square, true edge that requires no finishing. Used in building ships, boilers, tanks, cars and general plate and sheet metal work.



Patented June 3rd, 1913

SAVES 50% TO 90%

Eliminates Oxyacetylene Cutting and Plate Planing

Write for Catalogue

THE QUICKWORK COMPANY, ST. MARYS, OHIO, U. S. A.

Power Press Bargains

Partial Selection from our Big Stock:

3—Used FERRACUTE D-201 Vertical Double-geared Straight-sided Single-action Redrawing Presses, having capacity for exerting pressure of 200 tons. Length of stroke, 10". Distance between columns, 32".

1—Used FERRACUTE D-151 Vertical Double-geared Straight-sided Single-action Redrawing Press, exerting 150 tons pressure. Length of stroke, 13". Width between columns, 32".

6—Used FERRACUTE DGG-56 Vertical Double-Geared Straight-sided Single-action Redrawing Presses; 5 of these presses have 18" length of stroke and 1 has 20" length of stroke. Distance between uprights, 30".

7—Used FERRACUTE DGG-56 Vertical Double-Geared Straight-sided Single-action Redrawing Presses, exerting 100 tons pressure; 6 of these presses have 15" length of stroke and 1 has 12" length of stroke. Distance between housing, 30".

6—Used FERRACUTE DGG-55 Vertical Double-geared Straight-sided Single-action Redrawing Presses, exerting 75 tons pressure. Three of these presses have 15" length of stroke and three have 18" length of stroke. Distance between housing, 26".

1—Used FERRACUTE C-5 Open-back Inclinable Cutting Press, Direct Belt Drive., that is, not geared, having capacity for exerting about 50 tons pressure. Length of stroke 2". Distance from centre of ram back to frame, 12". Width of opening through back, 18½". Height of opening through back 7½".

3—Used FERRACUTE PAG-4 Geared Adjustable Bed Punching Presses, having capacity for exerting 50 tons pressure. Length of stroke, 2". Distance from centre of ram back to frame, 8½".

3—Used FERRACUTE PA-3 Adjustable-bed Punch Presses, not geared, having capacity for exerting about 35 tons pressure. Length of stroke, 2". Distance from centre of ram back to frame, 7".

1—Used BROWN-BOGGS No. 215 Inclinable Power Press. This is a geared press. Arranged with 24" x 6" pulley. Distance back from centre of slide, 9½". Distance from bed to slide, when up, 13¾". Width between gibs, 11⅞". Length of stroke, 4".

7—Used FERRACUTE D-45 Horizontal Double-end-Screw Press designed for deepening or redrawing sheet metal tubes and shells about 3" diameter and 18" deep. Capacity for exerting 100 tons pressure. Three of these presses have length of stroke of 36" and 4 have length of stroke of 40". Diameter of ram screw, 6½". Diameter of side rods, 5".

2—Used E. W. BLISS No. 60½ Vertical Geared Rack-driven Presses. Length of stroke, 36".

3—Used FERRACUTE E-57 Vertical Geared Toggle Coining Presses. Length of stroke, 3".

5—FERRACUTE E-56, Vertical Geared Toggle Coining Presses. Two of these machines have 3" length of stroke and 3 of them have 2" length of stroke.

4—Used No. 666 Vertical Geared Toggle Presses, manufactured by the TOLEDO MACHINE & TOOL COMPANY. Having 2¼" length of stroke and capacity for exerting 1,000 tons pressure on ram.

NOTE:—The above presses were all operating on manufacture of Cartridge Cases when work stopped about nine months ago. They were purchased new from manufacturers from February, 1915, to September, 1915, and have had about two years' service. They were not used continually since being purchased. Some have been repaired and all have been kept in good running order—Examination can be made in Montreal.

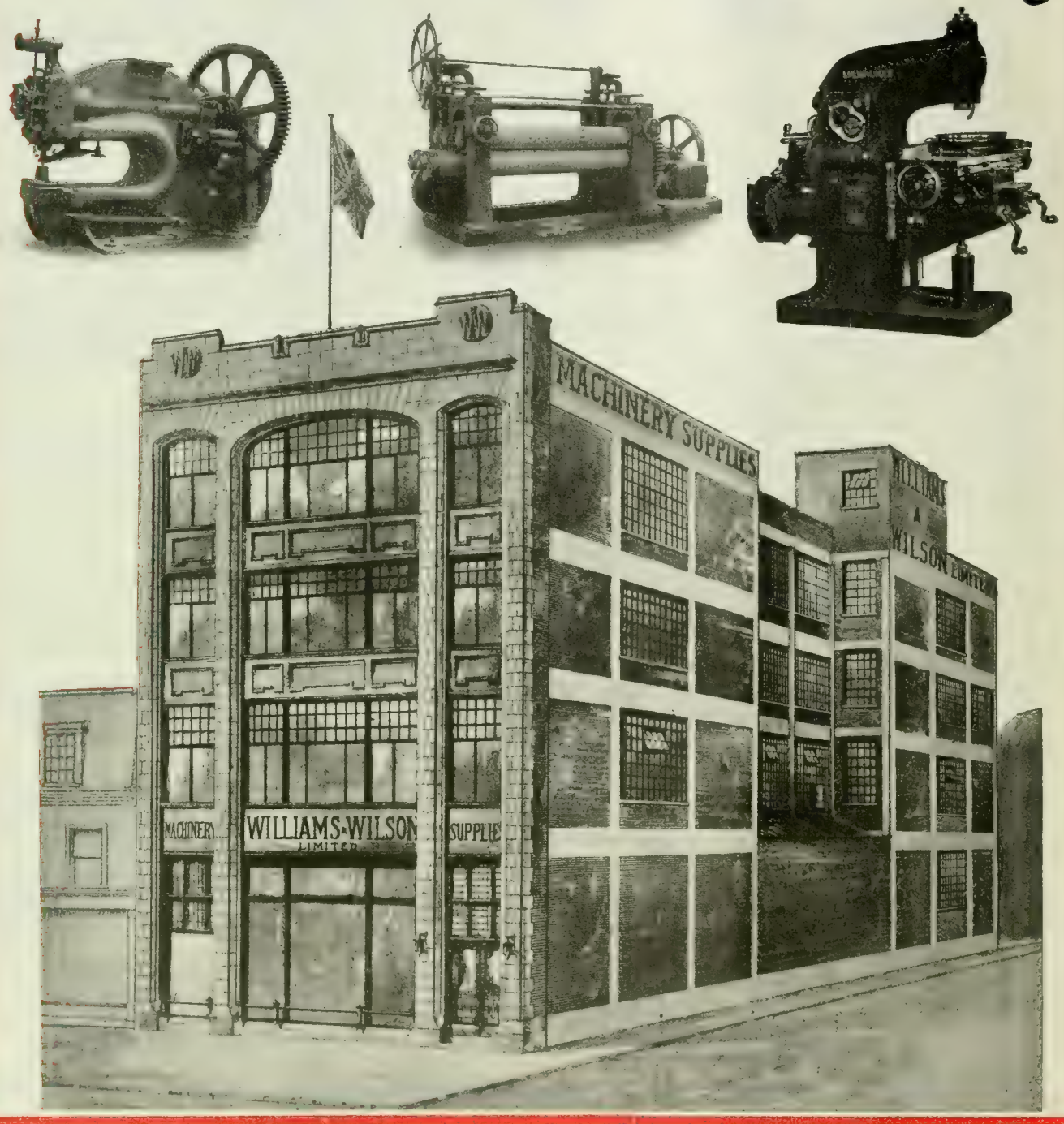
TERMS:—25% with order balance against Bill of Lading.

NOTE:—If these presses were to be shipped back to the United States there would be no duty to be paid—You would only require to add freight from Montreal to destination (except Brown-Boggs Press).

WILLIAMS & WILSON, LIMITED
Cable Address "Wilwill" Montreal, P.Q. Established 1891

84 INSPECTOR STREET

Where the Best in Machinery



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WILLIAMS & WILSON LIMITED
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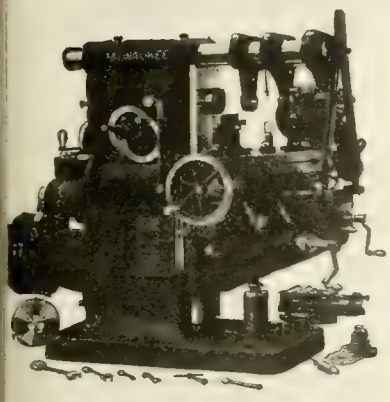
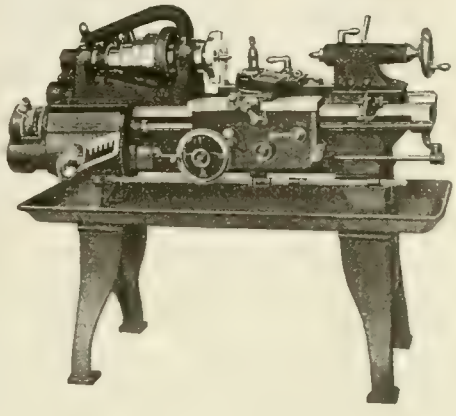
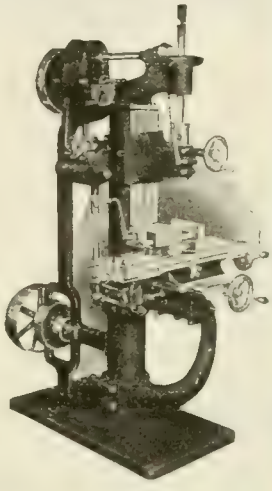




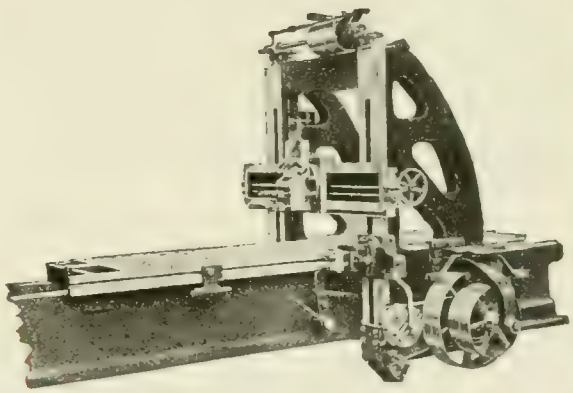


We spare no expense that will better our service

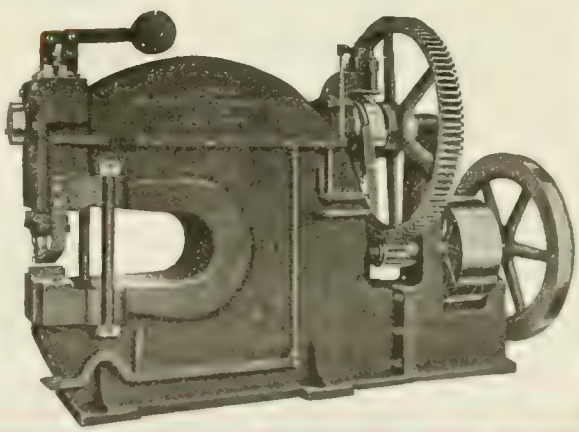
Top notch service and quality is a reputation that's good for business.

OUR NEW BUILDING at 84 Inspector Street, Montreal

contains a large stock of high quality, reliable machine tools from which we can make immediate shipment.



Write us about any tool or tools in which you are interested and we'll gladly quote prices and deliveries.



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Absolute Satisfaction Guaranteed

& WILSON LIMITED
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Established 1891

MACHINERY WILLIAMS & WILSON LIMITED MONTREAL

MACHINERY
WILLIAMS & WILSON LIMITED
MONTREAL

Used and New Machinery

MACHINERY
WILLIAMS & WILSON LIMITED
MONTREAL

Partial Selection From Our Big Stock:

PUMPS

One used 2" Downie Model A centrifugal pump.

Two size 5 Gould's centrifugal pump.

One size 2 Gould's direct motor driver centrifugal pump.

Two new Hydraulic Machinery Co. 4½" x 14" vertical hyd. pump.

One 6 x 4 x 6 Epping-Carpenter Duplex Steam Pump.

AIR COMPRESSORS

One 6 x 6 Nagle vertical air compressor.

One Canadian Ingersoll-Rand type R.P. 2, 29 x 12 x 16; 920 c.f.m. at 100 lbs. All in fine condition.

One used Jenkes Machine Co. class C B Air Compressor, size 10 x 10; capacity 190 c.f.m. Complete with unloading device.

One used Ingersoll-Rand class EL-1 Air Compressor, size 10 x 12; capacity 233 c.f.m. Complete with unloader. Practically new.

Two used Ingersoll-Rand 10 x 12 class E L-1 Air Compressors; capacity 275 to 290 c.f.m. at 100 lbs; 220 r.p.m. Complete with air receivers. All in fine condition.

One Canadian Ingersoll-Rand class P L B-2. Size 20 x 20 x 16; speed 225 r.p.m.; 1508 c.f.m.; 300 H.P. motor at 600 r.p.m. Motor pulley 31½".

ENGINE LATHES

Two used 26 x 10 C.M.C. quick change gear, 3 step cone, double backed gear.

Three 24 x 12 Whitcomb Blaisdell, practically new, quick change engine lathe. Four step cone, double backed gear, 4" belt.

One 22 x 10 Milwaukee engine lathe, three step cone, double back geared.

One 20 x 8' 6" Petrie heavy duty plain turning lathe, equal to new.

Three 20 x 8 C.M.C. standard engine lathe, three step cone, double back geared, in good condition, each lathe fitted with four jaw independent 14" chuck.

One new 18 x 8 Stevens standard engine lathe.

One used 18 x 8 Stevens standard engine lathe.

One used 18 x 8 Greaves-Klausman standard double back geared engine lathe.

One used 18 x 8 Mueller quick change gear engine lathe.

One used 18 x 8 Cincinnati quick change gear, three step cone, back geared engine lathe.

Two used 17 x 8 Sydney, very heavy duty, standard double back gear, in good shape and very heavy pattern.

One used 18 x 8 Milwaukee standard single back geared, having 12" independent chuck, in good condition.

One used 18 x 8 Milwaukee standard single back geared having 12" independent chuck, and with taper attachment.

One used Hamilton 16 x 8 standard single back geared, type B, with 10" independent chuck fitted, in fine condition.

One old 16 x 8 McGregor-Gourlay engine lathe, good for someone wanting very cheap lathe.

One used 16 x 7 Hendey lathe, mounted in oil pan and with bracket for taper attachment, complete with regular equipment.

One 14 x 8 ft. Hendey used engine lathe; good condition.

TURRET LATHES

One used No. 6 Foster, geared friction head turret screw machine.

One used 24" Gisholt turret lathe, with taper attachment. Hole through spindle 4¼ inches, three step cone for 4 inch belt, chuck 24" diameter. Four square turret tool post.

Two 1⅝ x 7 New Britain six spindle automatic screw machines.

Ten No. 33 New Britain multiple spindle automatic chucking machines, equal to new.

DRILLING MACHINES.

One used 4' Bertram plain radial drilling machine, thoroughly overhauled and refitted.

One new 26" Aurora heavy type upright drilling machine.

Three new 20" C.M.C. upright drills.

Twenty used Henry and Wright No. A, class "B" ball-bearing sensitive drills. 15" swing.

100 Avey No. ½ single spindle ball bearing bench drills.

50 Avey No. ½ double spindle ball bearing bench drills.

Four used Leland and Gifford heavy duty ball bearing 14" two spindle sensitive drilling machines.

MILLING MACHINES

One new No. 3 Ford-Smith plain miller, 34 x 10 x 20.

One new No. 2 Ford-Smith full universal miller, 25 x 8 x 17.

One new No. 2 Ford-Smith plain miller, 24 x 7½ x 19.

One new No. 1 Dow plain miller, 24 x 7 x 18, all complete.

One used No. 1½ Rockford plain miller, having vertical milling attachment, also slotting attachment and universal dividing head in splendid condition.

Five used No. 7 Becker Lincoln millers, with cabinet leg and oil pump, especially suited for key way cutting and manufacturing.

Six used No. 12 Pratt and Whitney Lincoln millers.

One used No. 1B Milwaukee universal miller, good condition.

GRINDING MACHINES

One used No. 2 Reid Bros. automatic surface grinder, complete with magnetic chuck, all in fine condition.

One used No. 3 Brown and Sharpe 12 x 40, universal grinder.

One used No. 70 Heald internal grinder, with type No. 7, style No. 1 head.

One used No. 1 Diamond automatic surface grinder. Range 24 x 12 x 9, with magnetic chuck.

One used No. 3 Wilmarth and Morman automatic surface grinder, with No. SF 8 x 20 D. and W. Fuse Co. magnetic chuck.

One ..o. 2 Brown and Sharpe used surface grinder, good condition.

One Landis used 10 x 30 plain grinder, good condition.

POWER PRESSES

Six used No. 18 Bliss fly wheel presses.

One used No. 73½ Bliss straight sided trimming press, fly wheel type, with side cutting off attachment.

One used 90-lb. Waterbury Farrell drop hammer, complete with power lifter counter shaft.

One used 120-lb. Waterbury Farrell drop hammer, complete with power lifter counter shaft.

One No. 4-A Styles adjustable bed power press, 4" stroke.

Two No. 8½ Zeh and Hahnemann patent percussion presses.

Two No. 10 Zeh and Hahnemann patent percussion presses.

Two No. 12 Zeh and Hahnemann patent percussion presses.

MISCELLANEOUS

Three 1" National triple head bolt cutters, capacity for threading ¼ to 1 inch diameter.

One 1½" National triple head bolt cutter, capacity up to 1½".

One Acme six spindle nut tapper, capacity ⅜ to 1 inch.

One 1¼ inch National semi-automatic nut burring machine, for burring all sizes from ⅝ to 1¼ inch.

One No. 1 Lapointe Brooching Machine, used, good condition.

One No. 3 Lapointe Brooching Machine, used, good condition.

FURNACES

Six Monarch No. 275 tilting crucible furnaces, in fine shape.

WILLIAMS & WILSON, LIMITED

Cable Address Willwills

Montreal, P.Q.

Established 1891

84 INSPECTOR STREET

STEEL PLATE CONSTRUCTION

We Design and Build

FOR

Oil Refineries
Oil Distributing Stations
Pulp and Paper Mills
Sugar Refineries
Packing Houses
Soap Works
Chemical Works
Asphalt Plants
Cyanide Installations
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Heavy and Light Steel Plate Work
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WORKS:
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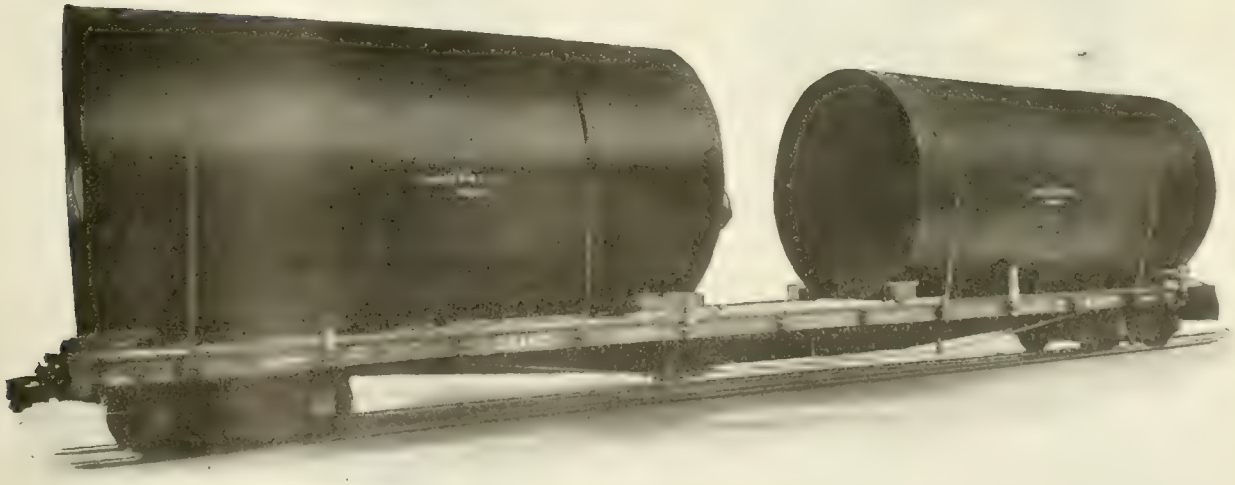

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All the energy of America's most modern machine shop and foundry is concentrated upon one product.

CONSOLIDATED POWER PRESSES

CONSOLIDATED PRESS CO.

HASTINGS - MICHIGAN
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CONSOLIDATED

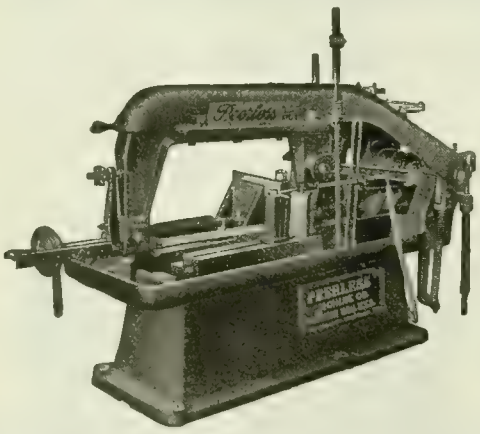
For trimming, stamping forging, punching, embossing.

Special presses are designed where the customer's requirements are unusual.

CONSOLIDATED POWER PRESSES

Peerless HIGH SPEED

Has Proven Its Efficiency Where Others Have Failed



DON'T turn down the "Peerless" because you have tried out other hack saws which did not answer your requirements.

Many concerns who were persuaded only with the greatest difficulty to try their first "Peerless," because they "just knew it would turn out like the others," are to-day among the largest and best-satisfied users of our High-Speed Saws.

The "Peerless" is different—and better. It does 50 to 100 per cent. more work, cuts with thinner saws and requires a minimum of attendance, saving time, labor, material, blades and floor space. What is your work? We can tell whether the "Peerless" will do it, and back our judgment with a 30-day trial. If it doesn't make good we pay freight both ways. Well?

PEERLESS MACHINE CO.
1607 RACINE STREET RACINE, WISCONSIN

Perfect Riveting

Provided its cost is the lowest possible, riveting so well done that it can't be improved upon, is perfect riveting.

Boys on Grant Riveters accomplish two and three times as much perfect riveting as an equal number of men using ordinary machines.

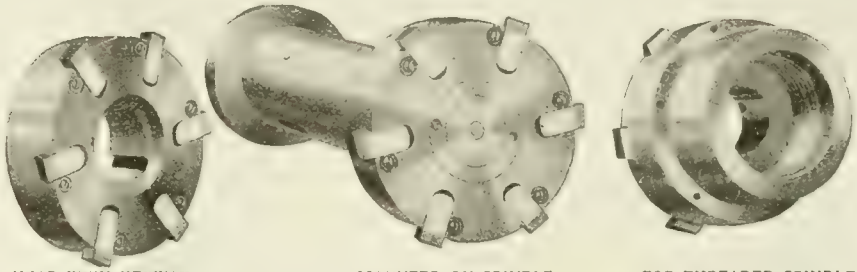
Send for "Perfect Riveting"

With the GRANT ROTARY VIBRATING RIVETER rivets placed close up to the shoulder of the work are as rapidly spun, perfectly smooth as are rivets in easy-to-reach spots.

The Grant Mfg. and Machine Company
Holland Ave.
Bridgeport Conn.

KELLY "HOGS"

For Rough Boring Cylinders



HEAD WITH KEYWAY MOUNTED ON SPINDLE FOR THREADED SPINDLE

THE KELLY PRODUCTION KIND

Some of its Features:

RIGIDITY—Blades imbedded in a Steel Body, withstanding Cutting Strains.

ADJUSTMENT—Almost 1½" adjustment to every Head.

STANDARDIZING—Kelly Standard Dove-tailed High-Speed Blades used.

SAVING—Short Blades used, eliminating High-Speed Steel Expense.

FEEDING—Feeds six times that of a single Point Tool.

SERVICE—Repair Parts shipped on a moment's notice.

SATISFACTION—Repeat orders from Satisfied Customers.

PROMPT DELIVERIES -- *SEND FOR CATALOG J-4*

THE KELLY REAMER CO.

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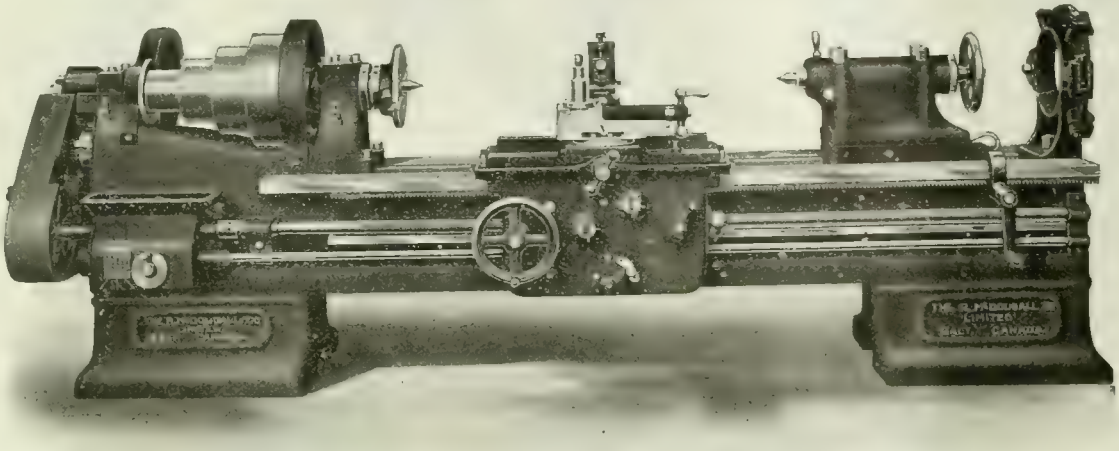
Every part of our Gap Lathes bears the "earmarks" of expert workmanship.

McDOUGALL GAP LATHES

And every feature is proof of our aim to produce a machine of unusual merit.



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Matthews' Letters and Figures are hand made from carefully selected tool steel. The characters are neatly formed, producing stamps that make easily read and durable marks on all classes of products. They reduce considerably the cost of high grade marking.

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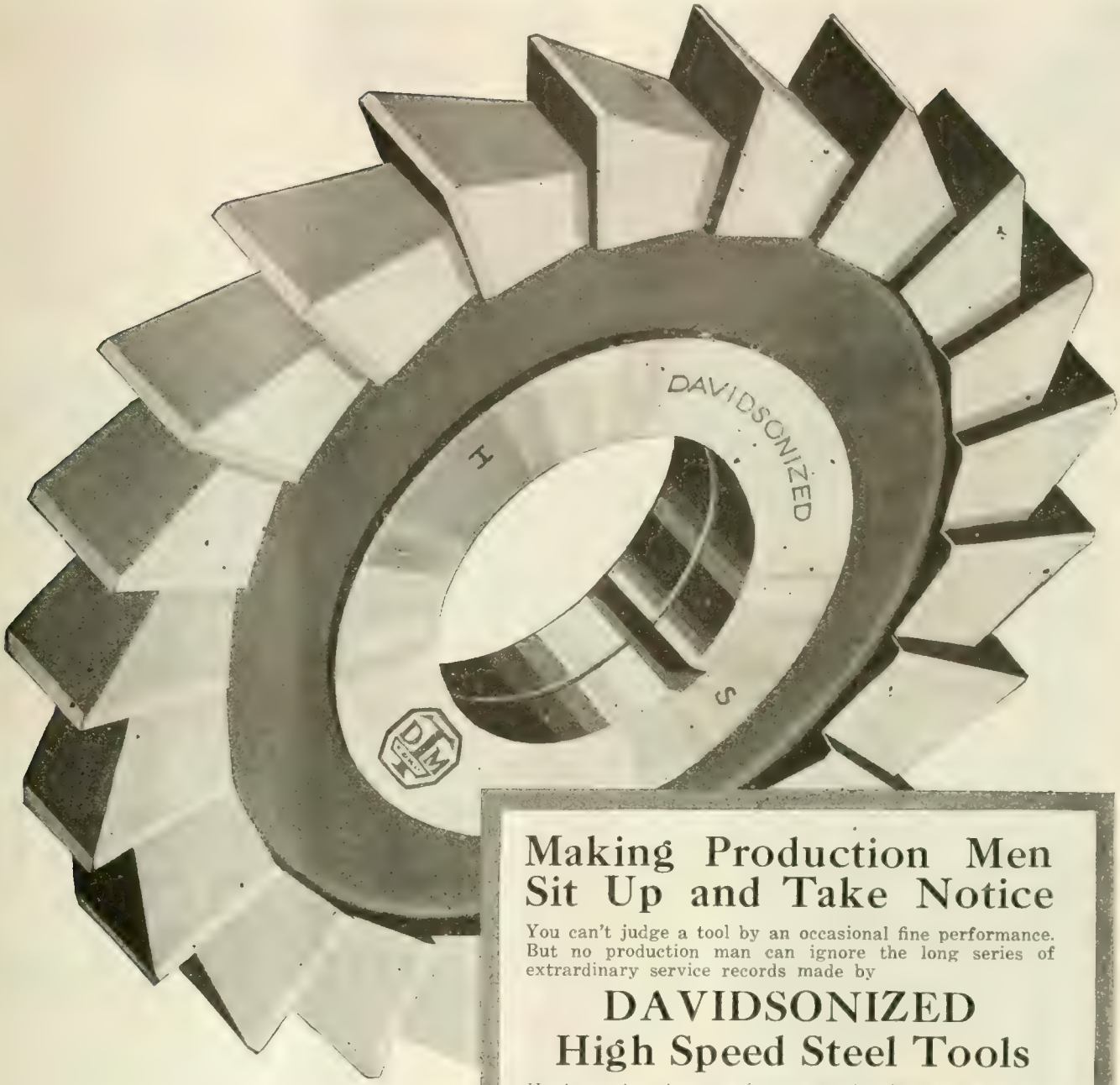

Making Production Men Sit Up and Take Notice

You can't judge a tool by an occasional fine performance. But no production man can ignore the long series of extrardinary service records made by

DAVIDSONIZED High Speed Steel Tools

Here's another rheent performance, stripped to the naked facts (name of plant on request):

Clevis Milling Job. Four side-milling cutters on arbor, each 6 in. x ½ in. x 1 in. Material, High Manganese Carbon Steel, forged stock. Standard production speed, 150 pieces per 8 hour day. Best previous tool performance 800 to a grinding.

In the competitive tests, the two outer cutters on the arbor were Davidsonized Tools, and the two inner ones of a well known standard make.

One of the inner cutters had to be taken off after 726 pieces; the second did 750. *After these 1476 pieces, at which point the test was discontinued, both Davidsonized Cutters were still in practically as good condition as at the start.*

Apply this concentrated to some jobs in your own and see what it would mean to you in terms of your own costs. Figure not on grinding cost the same word with the manner of steel, but the saving in the overhead and labor items through reduction of take-down and setting-up time. Then write us for further particulars, or say when our representative may call.

THE DAVIDSON TOOL MFG. CORPORATION

Main Office: 118-122 Maiden Lane, New York
Werks: 56-62 North 6th Street, Brooklyn, N.Y.

In Canada—The Canadian Fairbanks Morse Co., Ltd., Montreal, Toronto, Winnipeg.
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Special Service

To Concerns Who Make Their Own Tools

We will supply Davidsonized High Speed Steel Blanks, semi-finished to within approximately .015 to .020, either soft annealed or hardened.

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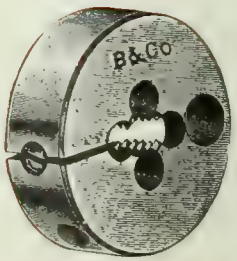

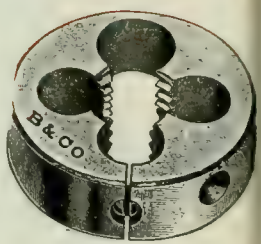

Twist Drills
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Invest in Butterfield Quality—it will pay you big dividends **in service.**

Butterfield Tools take heavy cuts with an ease and speed that make the best of material look soft.

Butterfield & Co., Inc

Toronto Office

Tools That Retain Their Keen Edges After Long Usage

ERFIELD

Reamers
Milling Cutters

The condition of the Butterfield line after long usage will convince you that it's made of unusually good material by men who know how.

Let us make you acquainted with it now by sending a trial order.

May we send our catalogue?

Rock Island, Que.

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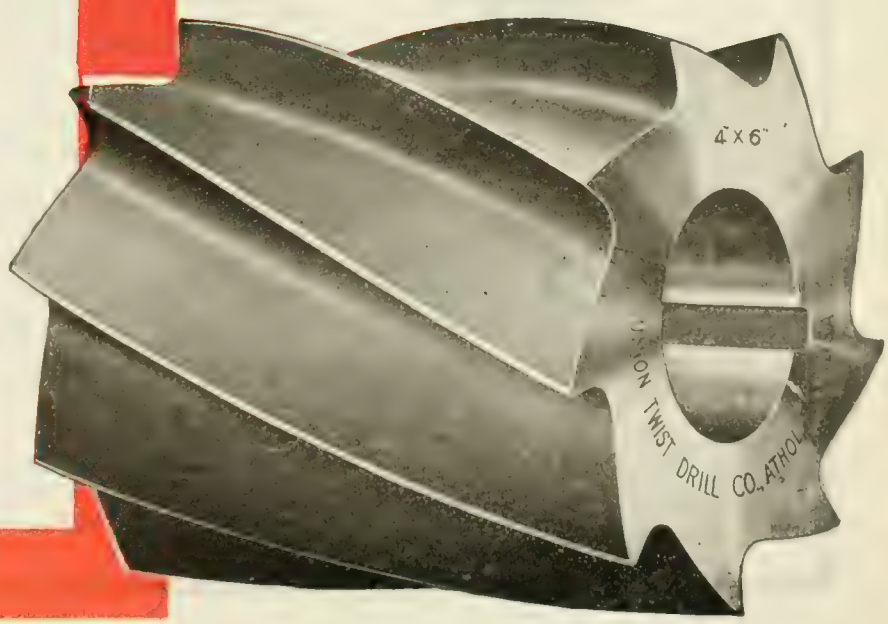
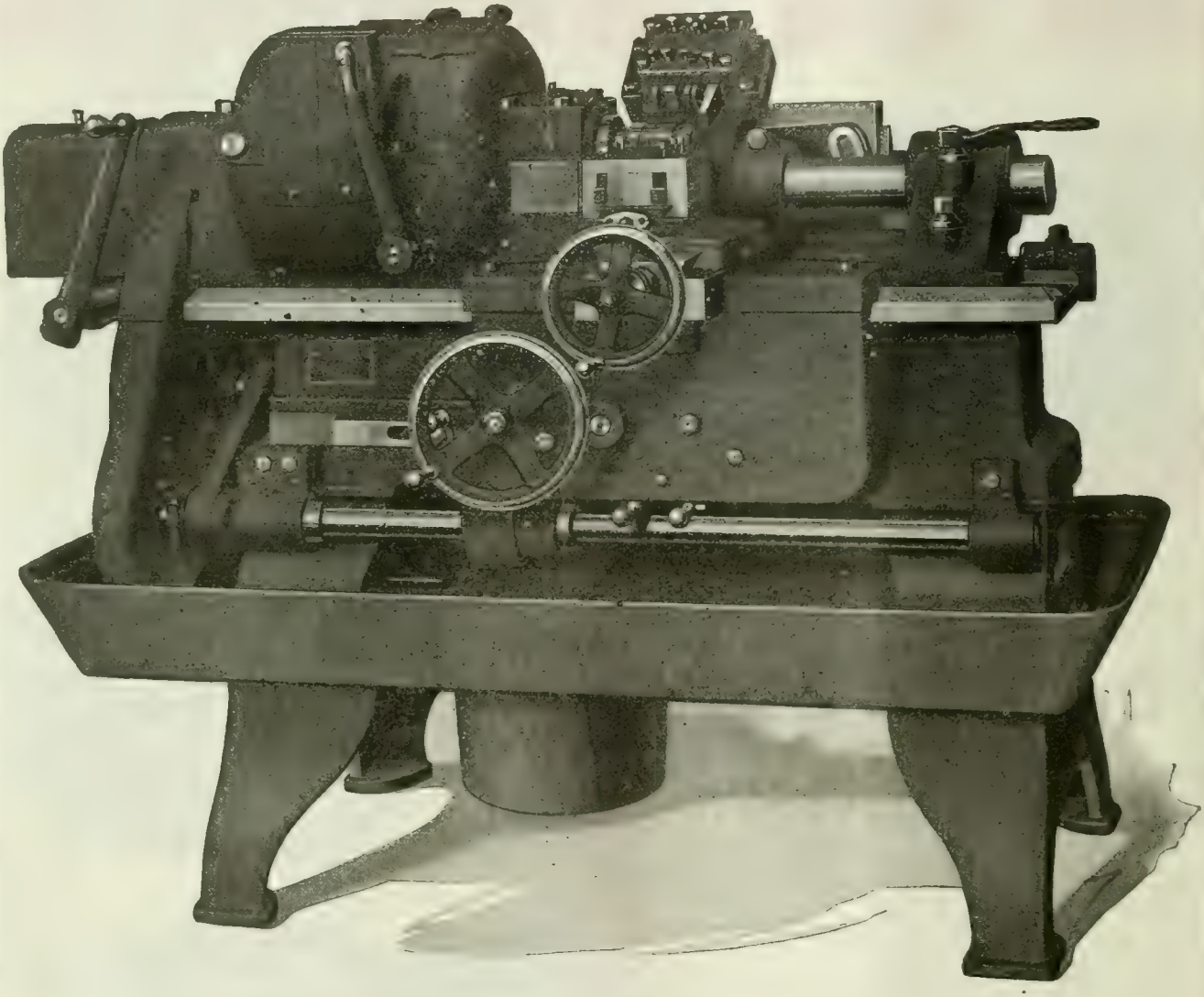


REED-PRENTICE COMPANY

R-P

WORCESTER MASS. U.S.A.



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A REED-PRENTICE AUTOMATIC LATHE FINISH TURNING, GROOVING AND FACING A 3¾" PISTON IN ABOUT 2 MIN. 30 SEC.

THE PISTON HAS BEEN ROUGHED OUT ON A REED-PRENTICE AUTOMATIC OF THE SAME TYPE BUT WITH DIFFERENT TOOLING IN ABOUT 1 MIN. 35 SEC. BEFORE COMING TO THIS MACHINE.

MAY WE FIGURE ON YOUR WORK USING a SPECIALIZED MACHINE OF THIS TYPE?

CANADIAN FAIRBANKS-MORSE CO., LTD.,
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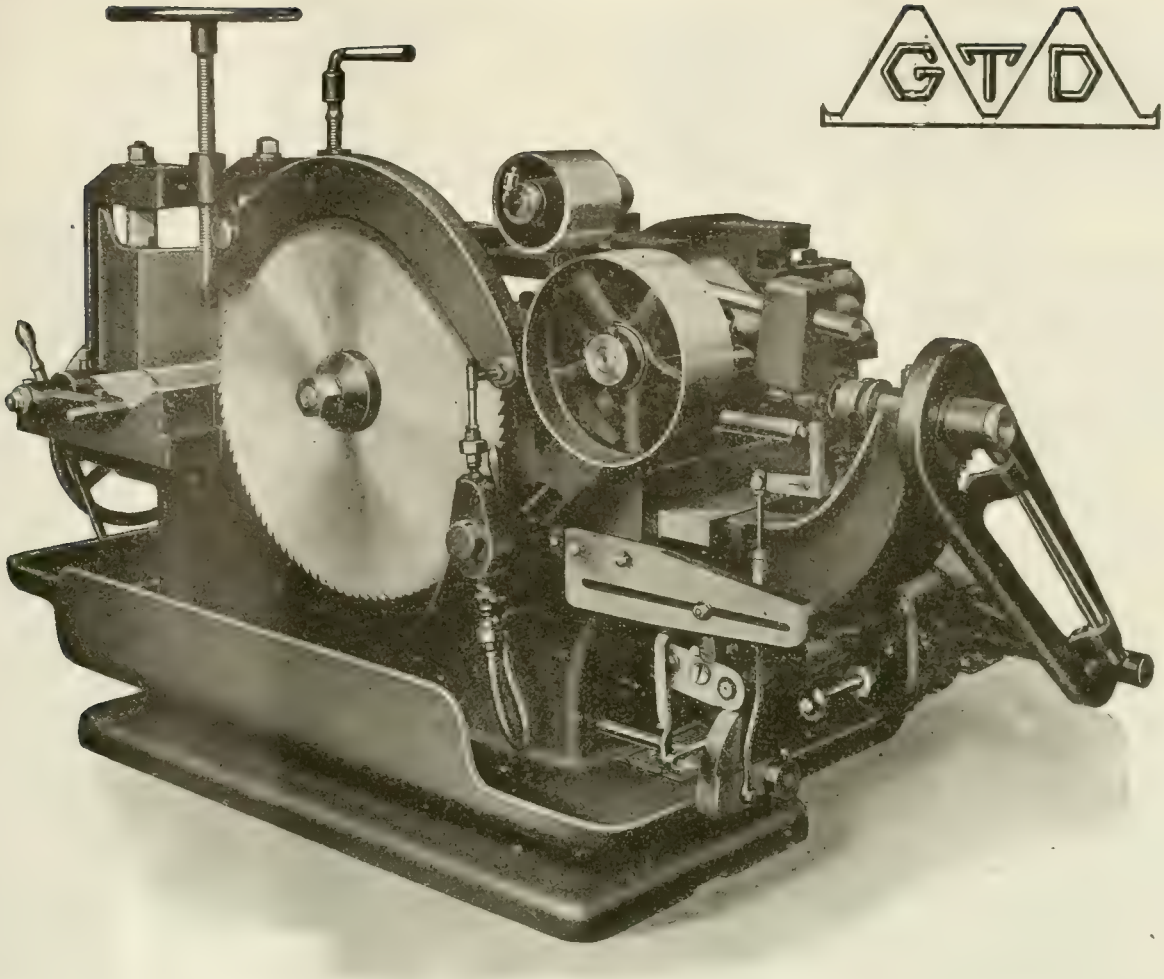
FENWICK FRERES



Nutter & Barnes Automatic Metal Cutting-Off Machine

In Your Steel Shed Means

More Profit
Cleaner Cuts
Bigger Production
Consistent Performance
Narrower Kerf (Less Waste)

Illustrated Catalogue No. 39 tells all about it. Get yours.

MACHINE TOOL DIVISION

GREENFIELD
TAP & DIE CORPORATION

Greenfield, Massachusetts, U.S.A.

World's Largest Manufacturers of Screw Cutting Tools

New York 28 Warren St. | Chicago 13 South Clinton St. | Detroit 74 Congress St. W. | Canadian Factory Wells Bros. Co. of Canada Ltd. Galt, Ontario

Canadian Agents: WELLS BROS. OF CANADA, LTD., GALT, ONTARIO

Note On Grinding
NORTON COMPANY WORCESTER, MASS.

No. 66A

Crystolon Wheels for Snagging Brass and Bronze Castings

The physical properties of brasses and bronzes vary as do those of steel. An understanding of the effect of different metals on these properties is of interest and importance to those who are called upon to recommend grinding wheels for snagging castings made of brass or bronze.

Brass is an alloy of copper and zinc in varying proportions from 40 to 90% copper and for special uses other metals are added in small amounts. The tensile strength of copper is 26,000 pounds. This tensile strength is increased to 45,000 by the addition of 30% of zinc to the copper. As the alloy is changed to 50% of each, the tensile strength drops to 1,000 pounds. Since tensile strength is the property that resists the removal of material, a change in this property will, of course, affect the grade of the wheel necessary. With other factors remaining the same, the higher tensile strength will call for a harder wheel on snagging operations with sharp contacts and perhaps a softer wheel on snagging, broad contact, and on precision grinding.

Adding lead up to 3% makes a softer, weaker material which will be more apt to load a wheel and call for a structure that will break down more readily. A treated wheel should be tried on this material, if untreated wheels do not prove satisfactory. The filling used in a treated wheel becomes fluid during grinding and lubricates the cutting grain at exactly the point of contact.

Tin and manganese give a harder brass and may make the use of a harder wheel advisable for sharp contact and a softer wheel for broad contact.

Iron to the extent of 1 to 2% increases the tensile strength to 80,000 pounds and gives an iron that produces a very sound, uniform casting. Owing to this high tensile strength an alundum wheel may be found more efficient than Crystolon, as the latter, being brittle, may break down too fast to give best results.

Bronze is very similar to brass. Phosphorus, aluminum and manganese with copper produce bronzes that have a high tensile strength, higher in some cases than 20 point carbon open hearth steel. This may also be an Alundum proposition.

A fairly large number of different grains and grades have been successfully used. This large variation is due to kind of material, condition of machines, speed of wheels, operator, size of castings, condition of castings as they come from the foundry, and many other factors.

Crystolon wheels 24 grade Q and 30 grade P are more often tried and more often successful than the others. We would recommend these two wheels for trial first, unless some local conditions made the trial of some harder or softer wheel advisable.

NORTON COMPANY

Canadian Agents: The Canadian Fairbanks-Morse Co., Ltd., Montreal, Toronto, Ottawa, St. John, N.B. Winnipeg, Calgary, Saskatoon, Vancouver, Victoria. F H. Andrews & Son, Quebec, Que

Grinding Wheel Plants, Worcester, Mass.

ELECTRIC FURNACE PLANTS
NIAGARA FALLS, N. Y. CHIPPAWA, ONT.
NEW YORK STORE 151 CHAMBERS ST.
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WHEN THINKING OF BELTING KEEP IN MIND THAT

The back of the Ox

is the part where the fibre of the hide is tightest and unaffected by the action of breathing, therefore the most suitable to produce a dead straight and practically stretchless belt.

Tullis
LEATHER BELTING
COLUMBIA BRAND

is made entirely from this portion of the hide.

SEND FOR OUR ILLUSTRATED CATALOGUE

JOHN TULLIS & SON, LTD.
BELTING SPECIALISTS
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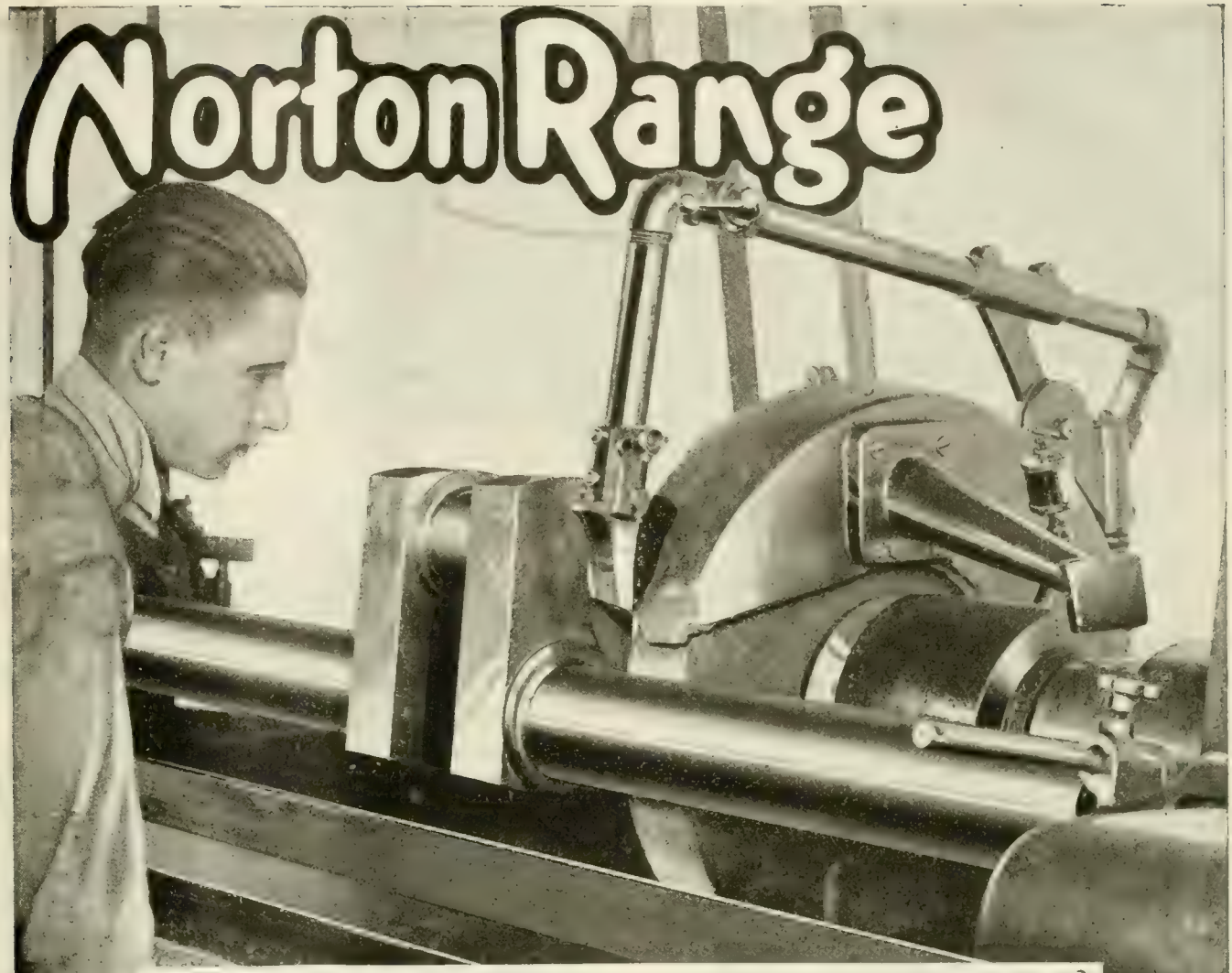
GLASGOW, SCOTLAND
Established 1834



WHETHER your particular grinding problem consists in turning out at high speed small, delicate parts or in handling massive steel mill rolls, we want to help you reach the most economical solution.

The size of the work and the rapidity of production are mere details which are easily surmounted. **Norton Grinding Machines** have long ago proved their effectiveness and economy on a wide range of work under varying conditions. Note the large crank shaft shown in the above illustration. The splendid finish is typical of Norton daily performance at the plant of The Enterprise Co., at Columbiana, Ohio.

Write us to-day for complete details regarding the Norton Grinding Machine

NORTON GRINDING COMPANY

WORCESTER, MASS.

Chicago Store: 18 NORTH JEFFERSON STREET

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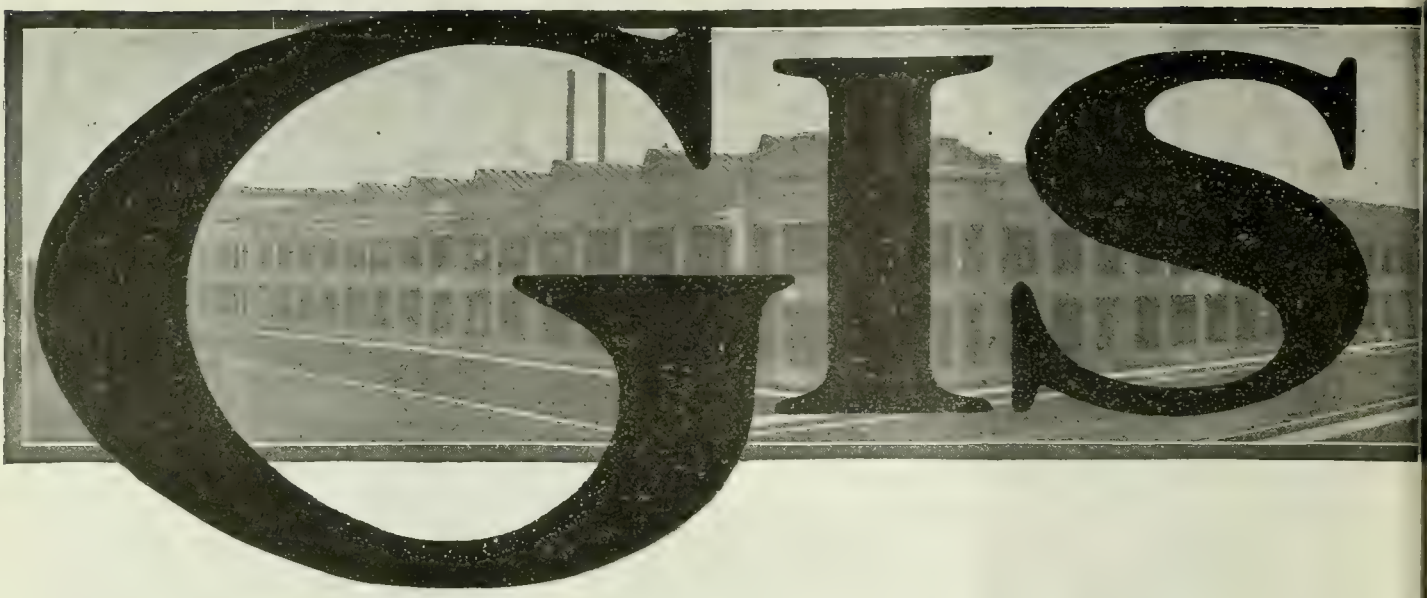
N-59



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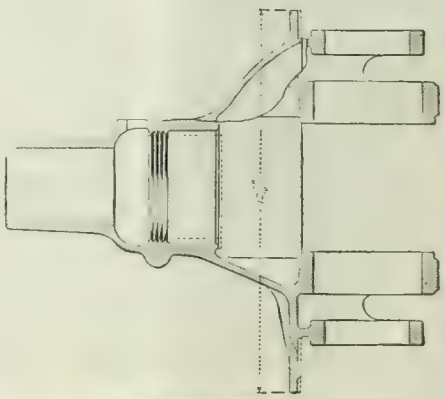

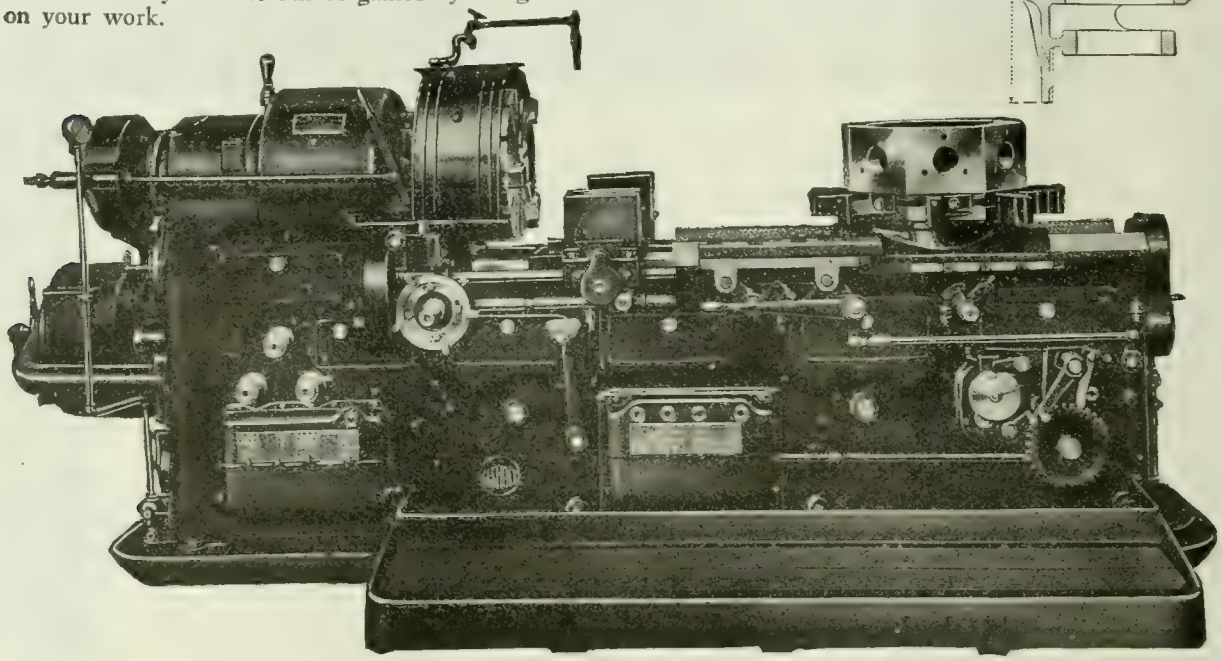

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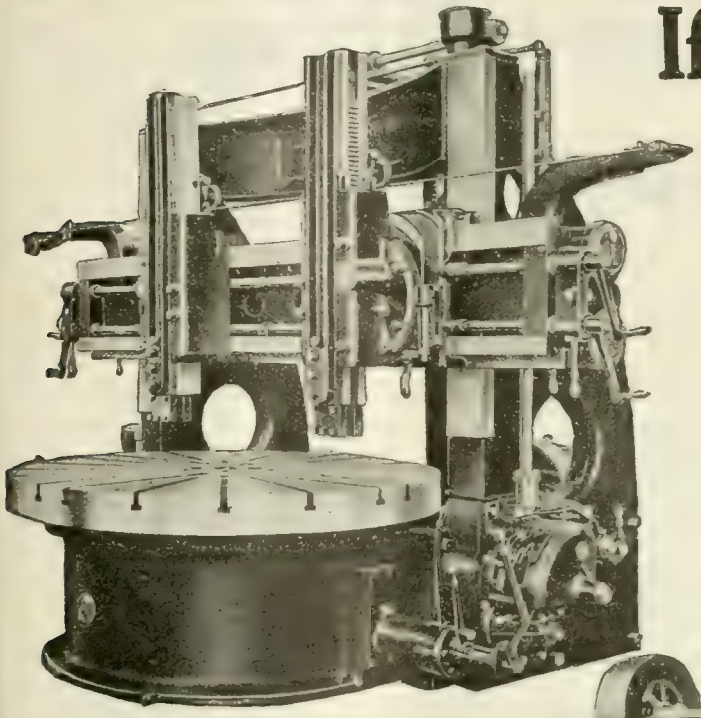

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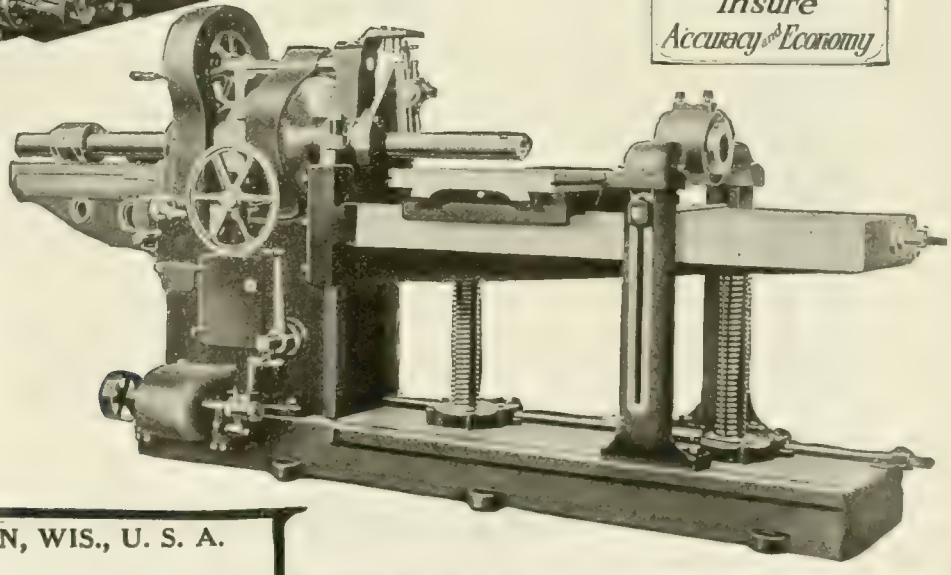

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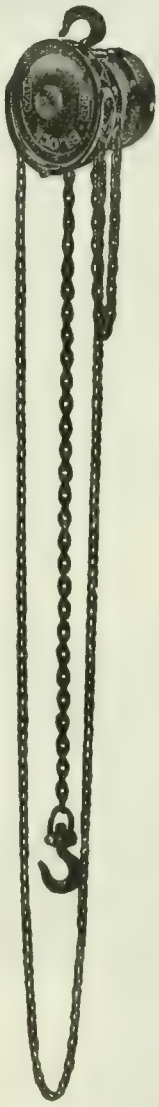

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CANADIAN MACHINERY
AND
MANUFACTURING NEWS

Volume XXII. No. 5 Toronto, July 31, 1919.

Do You Know Any of These Three Chaps?

HE occupied a fairly large place in the community. He was a manufacturer in a good way, and what he had to say about conditions generally carried some weight. In fact what HE SAID had quite a bit to do with what the community believed.

On this particular day this HE SAID individual stood on the corner just before parting company with the bank manager.

Of course the banker wanted to know his ideas about credits and the outlook in general. It was not possible to hear all that HE SAID, but such words as strikes, no output, hard winter, failures, high costs, were easy to hear. In fact, a person would not need to be an eavesdropper at all to get a whole earfull of real honest-to-goodness blue-ruin talk.

The banker went his way and HE SAID went his. Just as the banker was about to enter his office he met the man who used to attend to the furnaces in winter. Instead of saying, "Good morning, Joe," he stopped and asked Joe how things were going with him. "Fine," replied Joe as a starter. "Working every day at bigger pay than I ever hoped to get. My boy got back from France three months ago and he's working in the same shop. If you want to know how we're doing just take a glance at my savings account. It's right in your own bank here," and Joe was off with a smile.

And quite unconsciously Joe, the former furnace man, had put the axe into the burdock bush that HE SAID had planted in the mind of the banker.

Now as a matter of fact HE SAID was only a very ordinary individual.

Any croaker who decorates a sugar barrel in the old corner grocery could have handed out just as fine a line of headed-for-the-bow-wows talk. It does not require brains—it does not require courage, nor vision, nor executive capacity. Simply a wagging tongue and a bit of an audience—the rest is easy.

Nothing more was needed than that the tongue should wag and the audience not ask any pertinent questions that would confuse the wagger.

HE SAID lives in a good many Canadian centres. He is telling that coal is going to be very high this winter; that there will be an awful lot of people out looking for work; that building is almost at a standstill; that costs are high; that there is industrial unrest; that buying is from hand-to-mouth, and that our money is at a stiff discount in the United States markets.

Unfortunately there is no legal way of dealing with HE SAID. Certain animals can be muzzled during the hot days of August, but there is no muzzle for HE SAID. He is at liberty to go his way, throwing out doubt here and fear some place else.

The antidote lies in Joe, the former furnace man—Joe, the apostle of good news—Joe, the chap who knows enough to stay everlastingly at the harvest while the cutting is good.

If Joe gets along to boot HE SAID out of his job, he will buttonhole the banker and say that in spite of strikes, reported crop shortage, high costs, and all these things, that retail buying is heavy and payments good—that the world is short of scores of lines that must be grown or manufactured—that many big buildings must be gone on with very shortly—that failures of responsible firms are almost unknown—that Bolshevism has got a black eye—that the costs of the rest of the world are just as high or higher than ours.

Yes, Joe, the former furnace man, would have given the banker a real vision. He would have jumped into his mental horizon and shoved it back a couple of miles. The chances are that Joe would put more blue sky and sunshine into the banker's ideas than could have been hatched under any other circumstances.

Now, this is not visionary. HE SAID, Joe and the banker are real people, and they have been discussing real Canadian conditions.

They represent three conditions and classes in Canadian business. Sift them out and see where you fit in.

The *"Our Company"* Idea In the Establishment

Aiming to Create a Wholesome Atmosphere Where Strikes Are Unknown and Not Wanted—Some Ideas That Are Bringing Results and Which Are Well Worth Passing On to Others

By A. R. KENNEDY, Editor Canadian Machinery

Respectable Company:—

I send you heartful thanks for the flowers which were received on Saturday, and I am much better now.

I greet all those in the office and also Adam.

(Signed)

W. PANEK.

SUCH is the certificate of good character that one busy industrial concern in Hamilton prizes as highly as anything that has come its way. This particular certificate is not an embossed affair, neither is it framed, but it tells, in the heartfelt words of one of the foreign employees, just what the Benefit Club of the workers had done for him. His child had died, and the Club had seen to it that there was a decent funeral, with a generous showing of flowers. They had succeeded in making that poor lone foreigner know that they cared for him. The "Adam" mentioned, by the way, was the foreman.

Does this sort of work pay? Well, if you doubt it, a visit to the office and works of the Dominion Sheet Metal Corporation, in the industrial east end of Hamilton, will do considerable to iron out any skepticism that may linger in your system. The office is not far from the factory, and I mean that in more ways than one, both in distance and feeling and understanding. It was about 96 in the shade the day I was at the works, but there was ice water out in the factory just the same as in the office—in fact it didn't take long to "feel" that there wasn't much need of a strong organization in the works to see to it that the men got a square deal from the office. And there was a little notice posted up just outside the superintendent's office announcing that on a recent date the wages of all the men in the place would be advanced two cents an hour. No, there hadn't been a strike, not even a threat, nor yet a deputation from the men. Business warranted it, the men deserved it, and what more should be necessary?

Perhaps a Bit Modest

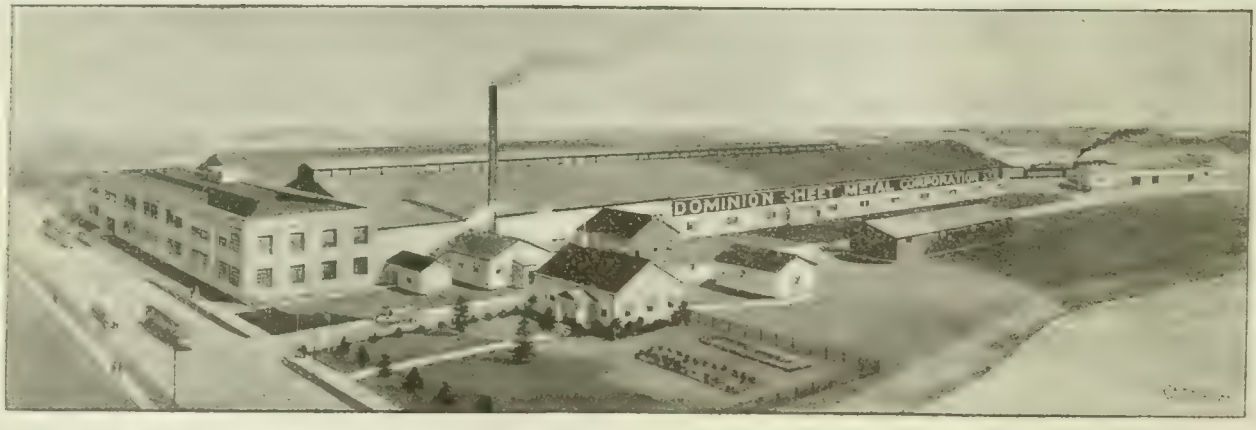
A. T. Enlow, the president and general manager of the company, is no theorist about conditions in the industrial world. He likes to turn on the steam and see how it works in reality.

But he has imperfections. From the standpoint of the interviewer he's too modest. He likes to soft pedal the stuff that would make a story stand right up. He seems to have a large-sized and very wholesome regard for the feelings of any of the men who have been helped a bit by the plans he has put into operation. We'll not use the word "schemes" in connection with anything that has been done at the Sheet Metal's plant, because there is nothing of the "scheme" idea about them. As far as I could judge there were straight, honest-to-goodness proposals, and there was "something in it" every time for the men in the shop.

Mr. Enlow probably has several reasons for the manner in which he conducts his business. One of them is that he likes to do it. Another is, so I was told by a friend of his, that in the beginning of his own career in business he was gouged pretty hard by the money-grabbing sort of employers, followed later by contact with big-hearted, noble-souled types and it aroused in him a determination, if the opportunity ever afforded, to employ the latter system. Then, too, and Mr. Enlow will admit this, he considers there is a large element of self-preservation in it, as far as the company is concerned. He is anxious to build up that greatest of all things, an organization from the office right through the factory that's working, and intends to keep on working for "our" company.

Not An Old Company

The Dominion Sheet Metal Corporation is not an old concern. It started to operate in 1915. The business is growing nicely, and a nice addition is planned for this year. Through all the time from the start to the present there has not been a man laid off, and the employees



PLANT OF THE DOMINION SHEET METAL CORPORATION, HAMILTON, AS IT WILL APPEAR WHEN THE ADDITION ACROSS THE FRONT IS COMPLETED THIS SEASON.

who hold stock have never been told that the dividend for the quarter or for the year has to be "passed."

To get at the thing right it might be well to start from the beginning. I'm not particularly interested here in the growth of the concern in a dollars and cents way, but more in tracing what can be found of the new feeling that must come more and more to the front in the industrial world. In 1916, it was decided to make a start with a five per cent. bonus to all who were in the employ of the firm on the 20th of December. Made a nice little Christmas present, and likely served as the corner stone for the many other things that followed.

1917—The same five per cent. bonus was continued, and this time the staff were given an additional yearly bonus. The "Benefit Club" was also born this year, but the workings and particulars of this will be given later.

1918—Ten per cent. bonus to all; yearly bonus to staff; Benefit Club work enlarged; Garden Club and a tonnage bonus to the shop force.

1919 — Staff bonus, tonnage bonus, the yearly per cent. will be paid, Benefit Club doing more and better work; stock offered to employees on very generous terms, and vacations for all with the time paid for by the company.

The Benefit Club Idea

Taking the name from the well-known brand of the shop, "Premier," the name of the Benefit Club is the "Premier." "All the employees put in fifty cents a month each," stated Mr. Enlow. "In fact it is no use having a benefit club if the men do not put some of their own money in. The company's share in the work comes from putting in the bonuses of the men who quit before the year is up. We simply take the yearly pay roll. We know what the total on that should be for bonuses, and we know what we have paid out. The difference goes to the Benefit Club. In 1917, we put in $780 and in 1918, $1,800. In this way the company does not gain in any way by an employee leaving."

At the outset plans were laid for quite an imposing set of rules and regulations. But then it was decided to try something simpler, and now, as far as I can gather, the rules and regulations state that the Premier Benefit Club exists for "social and beneficial purposes." Well that's pretty broad and pretty general. In fact it might be said that the sky's the limit as far as being confined in any one direction. But it works at any rate, and the letter quoted at the first of this article shows how the work is reaching home in a very certain and a very much appreciated way. This Premier Benefit Club does a number of things that it would be very hard to set down rules and regulations for. There are times, as in every other community, that the stork sees fit to visit the homes of some of the members. And after that call is over it is quite necessary and proper that a bit of a chariot be provided for the new arrival. Such cases have been attended to by the Premier Benefit Club. It would be mighty hard to draw up a set of rules which would cover such a happening, but without too many rules it is easy. Then again when a wedding takes place it is necessary—desirable at least—that something should be done. The committee thinks it over, and goes to it. When the "flu" came along there were, in the latter stages of the epidemic, several homes of employees invaded by the malady, and little ones were taken. There was nothing in the constitution either to hinder or suggest what action should be taken. But there was something better, the will to do the right thing. And so it was that on several occasions a good burial was made possible, and there was a nice showing of flowers, and nothing is more sacred, especially to the heart of the foreigner, than that a funeral from his house shall be conducted decently and in good order. There are a dozen more ways of looking after men than simply seeing that they draw a certain limited amount when they are sick, and the Premier Benefit Club is finding this out, and having a good time from it in the meantime.

The capacity of the galvanizing plant—for galvanizing is really the first and last work of the plant—is thirty tons per machine per day.

By careful planning and close application it is possible to shove the lid off that limit by quite a fair margin. So it was that early in 1918 a bonus was planned for the men engaged in the galvanizing operations. This worked well, but it was not broad enough. "All the men in the shop could not work on that particular operation," stated Mr. Enlow, "and so we recognized that they could all hinder or help the output. So we simply made the bonus applicable to the whole shop. As soon as the 30-ton output for the day has been reached we pay one cent per hour for each additional ton. That is, if the output for the day is 35 tons, the men in the shop get an extra five cents per hour for that day. I guess it averages about $10 per month to each man. And here is a little something," laughed Mr. Enlow, "that others may not have found out yet in the payment of bonuses. Put the bonus in a separate envelope. You know there are a good many married men in every shop, and good, well-trained chaps that they are, they like to present the pay envelope unbroken at the house. And they like to have this little bonus as something entirely their own. It is a good plan to keep the bonus separate. It takes only a little bit of work, the men want it that way, so that way it is around here."

Yearly Bonus to Staff

Depending on efficiency and service, there is a bonus paid to the staff, the exact figures of which, of course, are not for publication. I saw some of the figures though, and it is sufficient to say that they are large enough to earn the name of bonuses.

"You know," continued the president of the company, "it does not do to let a good man get away from you too easily. So we pay the bonus according to worth and service. We are starting now to pay quarterly instead of annually. We find that is far more popular with the men. It may amount to about the same in a year, but it comes four times as often and very often comes just when it is needed. For instance, a bonus payment coming due at this time of year is going to help quite a bit when a chap is considering what he and his wife and family are going to do about the holiday business."

Holidays For All Concerned

The company is adding another sprout to the tree this year in vacations for all. That is just what it means.

Several years ago, after the Sheet Metal Corporation got established in Hamilton, they bought a piece of land in the best hunting ground of Northern Ontario. A car was sent up in that direction with a goodly supply of their own material and a snug little cabin was set up in the woods. The superintendent was asked to keep an eye out during the season for the men in the plant who were doing good work. Well, along in the fall the list was made out and the lucky, but deserving dozen, were told to quit work and get ready. The company staked them to the grub pile, a chef, dogs, guide, guns and ammunition, and they set forth to shoot up the North for a couple of weeks in the hunting season. I haven't time here to tell just what the men say of this trip. But it was not only a good time for the dozen, it was the planting time for the general holiday seed.

"After these men had gone," remarked Mr. Enlow, "I thought it over again, and it occurred to me that they can't all be stars. There must always be the average man, just as deserving as the other chap who is perhaps a little more brilliant. So this year we are going on with the hunting expedition plan just the same, but we are going to give every person a week off with full pay."

Selling Stock to Employees

If the agreement between the company and the employees, presented below, is carefully read, it will be seen that there is an effort made to make it possible for the employee to get his stock paid for quickly by crediting him with the earnings of a like amount of common stock. He is really earning 14 per cent. on his stock during the period of payment. He is guaranteed eight per cent. after that, and a desire on the part of the company to protect itself against anything unseen that may happen in the future keeps it from putting in writing any further promises. The desire is there, and it would not be surprising if better than eight per cent. were done after the stock is paid up, although it must be admitted that there are mighty few eight per cent. propositions available at the present time.

Here is a copy of the application for preferred stock of the company. Just to show how it works out the blanks have been filled in as though the amount were five shares:

Applicants For Preferred Stock

June 28, 1919.

To Employees of Dominion Sheet Metal Corporation, Ltd.

Kindly note conditions of this issue and signify your consent to same by signing this agreement in duplicate, retaining one copy.

Your allotment is 5 shares.

The certificates will be dated June 1st, 1919, and carry regular 2 per cent. quarterly dividends from that date.

You agree to pay $10.00 each month beginning June, 1919, which payment is to be applied against total of $500.00 in purchase thereof.

In addition dividends of 2 per cent. will be credited as declared and paid by Dominion Sheet Metal Corporation, Ltd. No interest will be charged on unpaid balances under this agreement.

At the close of our fiscal years, November 30th, 1919 and 1920, you will receive credit to correspond to the annual rate of dividend paid on the same number of common shares of the Corporation's stock, and quarterly during 1921 at the quarterly rate paid on Corporation's Common Stock until final payment is made.

When final payment is made the stock will be delivered to you by Dominion Sheet Metal Corporation, Ltd., and thenceforth will carry regular quarterly dividends as paid on Corporation's Preferred Stock.

Prior to final payment, or on termination of your employment before final payment, you shall be entitled to transfer your interest to any other employee who will agree to pay balance on original terms, and who shall receive the same dividends and credits, or to sell stock to anyone not an employee provided said purchaser pays balance due to Dominion Sheet Metal Corporation in one payment forthwith, and who shall thereafter receive regular dividends as declared and paid on preferred stock.

It is agreed that Dominion Sheet Metal Corporation, Ltd., shall retain stock in their keeping until final payment.

The employees subscribed under this plan for one hundred and eighty shares, against which one hundred shares, par value $10,000, were allotted for the initial issue.

The Housing Problem

Eight of the company's sixty employees who were confirmed "tenants" bought houses during the past two years. There would undoubtedly have been more if the company's list of employees had been larger. But it is growing. Mr. Enlow can hardly hide the fact that he is just a little bit proud of the class of houses that his men are getting. He doesn't like the "housing" scheme in the ordinary sense of the word. I don't think he would like to have the employees of the Dominion Sheet Metal Corporation living in a row of houses all the same, with no front yards, and no back yards and no play ground but the street. "The average value of the eight houses of employees who went into the housing business this year was $4,400," stated Mr. Enlow. The company has no housing scheme, in the generally accepted meaning of the term, but I happen to know that Mr. Enlow makes it his business to find out how and where the men in the shop live. He has gone to more than half a dozen this year and advised them to buy. When that big problem of making the first payment so that there should be no second mortgage has come up the president has done the solving. These eight required an average of $560 to finance the start. They got what they needed. They went in and bought the house they wanted in the district they wanted. They didn't have to buy where the company wanted to build, nor did they have to locate across from the shop. The houses are pretty well distributed. Four of the eight don't owe Mr. Enlow any money now, and the other four are coming along splendidly with their monthly payments. There is no set policy for the company in this regard, but there's something quite a bit better, for here's what the president of the concern told me: "You can't have contented and happy conditions in a shop until you have your men living in good homes under good circumstances. The men don't live in the factory all the time, and a home life has a lot to do with the efficiency of the man."

And there are other things that go on around the plant at Hamilton, but they are not going to be printed in full here. But there is a good feeling in the office toward the factory, and there is a good feeling in the factory toward the office. That place is going to grow. If it doesn't then all the laws of right and wrong must be shot to pieces. There is a nice addition going on this year, right across the front of the premises. It is shown in the picture of the works in this article.

Out of it all Mr. Enlow is getting something bigger than dollars or dividends. I imagine that at times he has a pretty good session watching these plans work out, and I know that the letter from the foreigner, Panek, in which he addressed the concern as "Respectable Company," was remarkably well preserved.

"Any trouble in keeping our hands here? Not now, or even when the munition making was on," said Mr. Enlow in conclusion. "We feel that we are under a moral obligation to keep our men at work steadily. This plan of laying men off just as soon as work falls off a little is not right. It sets the worker back too far. It is the steady position with good conditions that will hold your men and secure results. When munition making was on we used to have foreigners right at our office door trying to take our men away to jobs where they promised them twice as much on piece work. Some went but they came back and we took them on, and they are still here. I would not say that all the things we try out are practicable all over, but they work here."

There's somewhat of a wholesome philosophy to the entire surroundings at the Dominion Sheet Metal Corporation. It's not bound up with red tape. I imagine that if any man in the plant had a complaint that could not be adjusted with the foreman or the superintendent, he wouldn't have much trouble getting a hearing with the president. The atmosphere is not there for breeding trouble. Although none of the company officials said so, it looks as though they had decided to go ahead and get something better rather than wait around for something worse to arrive.

Steel Mill Electric Drive

During the war many steel mills which had hitherto been steam-engine-driven substituted electric drive for all additions to existing plant. The fact that electrical equipment could be put in quickly and at smaller expense was responsible principally for this change. The electric drive has been fully justified, and the writer looks forwards to an increase in the electrical operation of the steel mills. A more common use of central-station power has been made during the war period in particular. It has been a factor in facilitating installations and also offers many advantages in reduction of first cost of plant, reduced cost of operation, and in permitting greater flexibility of plant layout for future improvements. More than 50 per cent. of the motor equipment installed during the last two years use central-station power and more than 60 per cent. are 60-cycle units. The tendency toward the adoption of 60-cycle apparatus as a standard is very marked. —Brent Wiley in the "Review," May 10, 1919.

Goldenrod not responsible for hay fever.—A protest has recently been raised against the time-honored project of adopting the goldenrod as the national flower of the United States, on the ground that this plant is a cause of hay fever and hence nothing ought to be done that would encourage it prevalence. A statement has now been issued by Dr. W. Scheppegrell, on behalf of the American Hay-fever Prevention Association, in defense of the goldenrod. It is asserted that while the pollen of the goldenrod may cause trouble when applied directly to the nostrils or used in large quantities for room decorations, as a cause of hay fever out of doors it is absolutely negligible. "It is one of our most beautiful flowers," says Dr. Scheppegrell, "and well merits its selection as the national flower of the United States."

The Arctic Night

Viewed solely as a matter of optics, the Arctic night is as dark as any night. Explorers in high latitudes say, however, that there are many alleviations of the obscurity. The stars flash keenly, the moon comes along in a regular succession of phases, the snow surface relieves the gloom under conditions of the utmost absence of light, and the aurora borealis is the finest kind of illuminant. Explorers all agree that their men pass the winter night without much difficulty if only there are means of amusement.

It is estimated that at the present rate of consumption the United States can make its coal deposits last till the year 2300. England claims their supply is sufficient for three hundreds, and still the coal goes up in price. However, we should worry, for while the price is high, we at least know coal will not flicker out before we shuffle off.

Sir Robert Borden, the Premier of Canada, in a statement dealing with the natural resources, of the Dominion, emphasizes the great source of potential energy in the form of water power. On the River St. Lawrence alone, between Lake Ontario and Montreal, he estimated that Canada has the opportunity of developing 2,500,000 h.p. The Premier's statement says in part: "This asset has already been considerably developed, especially in the Provinces of Ontario and Quebec. It lends itself to the development not only of manufacturing industries but of agriculture. Conducted to the rural districts by great distributing lines, it is employed on the farms in many useful services. The opportunity which it gives for industrial development is almost beyond imagination."

British Geological Society admits women members.—Another of the leading scientific societies of Great Britain, the Geological Society, has decided to admit women as fellows. This step has been considered by the society on three previous occasions, with negative results.

The Department of Agriculture has started a campaign against careless threshermen. It wants only "clean straw ricks" left of the greatest grain crop the nation has known, so the threshermen will be aided by the Government to develop efficiency and avoid loss in separating the wheat from the chaff. Records of the Department reveal startling losses of grain "through avoidable waste of the threshermen." Tests made in "just ordinary" crop years show that an average of from 25,000,000 to 27,000,000 bushels is thus thrown away.

Darling in Detroit "News."

Preparing for the Deluge.

RECOGNIZING THE HUMAN SIDE OF INDUSTRY

Bridging the Gap Between Office and Shop is Worth a Great Effort.

By A. R Kennedy.

One view of the First Food at Cost Cafeteria at Massey-Harris Plant, Toronto.

THE Massey-Harris Co. have considered a large number of plans for bringing the men in the shop closer to the management, and likewise the management closer to the men in the shop. A large number of plans were considered, and a large number were thrown aside. The plan now has settled down principally to two plans—(1) The industrial council and (2) the selling of stock at very advantageous terms to men in the works. The plans cover the works at Toronto and Brantford, also the associate companies, the Verity Plow Company at Brantford, and the Bain Wagon Company at Woodstock.

The Industrial Council

Mr. J. N. Shenstone, vice-president of the Massey-Harris Co., discussed the matter at some length with CANADIAN MACHINERY. "We do not claim that all the ideas in the industrial council originated here," he stated. "We went over a large number of plans, and wherever we found a good idea we simply wrote and thanked the firm that originated it. One thing that was uppermost in the mind of the whole management was this," continued Mr. Shenstone, "it may have come as a result of the war, but we are certain that the men in the shops are entitled to a greater share in the profits of industry. And along with this we want them to feel a greater responsibility for the carrying on of the work. Under the plans we now have inaugurated the management expects the representatives from the shops to suggest improvements in working conditions. If things are not right we want them to come right out and say where they are wrong, and wherein they can be benefited. The same thing applies to sanitary and other conditions. We want the men to help us to make the conditions desirable ones in which to work. We realize that there are obstacles in the way of forming and operating an industrial council, but we are determined to make an honest effort to bring about a feeling of mutual satisfaction. It is well worth the effort, because without such a feeling existing results can never be secured.

Yes, the Women Vote

"The plan we are working on now," continued Mr. Shenstone, "in regard to selling stock in the company is simply a continuation of the scheme that has been in effect for some time. For several years after the formation of the company all the shares were held by the founders and their families. Some ten or twelve years ago the share list was considerably expanded by the sale of several large blocks of stock. At that time we thought it would be well to interest some of the heads of departments, and they were able to secure their stock on very advantageous terms. This plan has been going on since, and now with the latest effort we have some 400 shareholders, including branch managers, sales staff, heads of departments, mechanics, and office staff. It is impossible to see how much this list will expand, but we want it to grow. When conditions become settled the number should increase to at least one thousand, and we do not want it to stop there."

The Offer of the Company

In a notice sent out on the 28th of May the company states:—

"The directors are strongly of the opinion that the interests of the Company and its employees are interdependent and are, therefore, desirous that the share list should include many more of the men and women on its staff in the various branches and factories.

"From our experience with the sale of Victory Bonds, we believe that a large number may be able to buy some shares at once, paying cash for them and adding to them from time to time as they can save additional money. We realize, however, that it would not be possible for many to purchase shares in the ordinary way, and pay cash for them, but we feel sure a large percentage of our employees could buy a moderate number of shares and pay for them on extended terms of payment.

"In order to provide an investment for those who have some money saved and to promote thrift among others, at the anuual meeting of the company,

held in April last, the shareholders authorized the directors to set aside $500,000 par value of the Company's treasury stock for sale to employees who have been in the Company's employ for two years or more, and who are not receiving, in wages or salary, more than $2,000 annually.

"It was decided that these shares might be sold, when necessary, on very advantageous terms to the purchaser, namely, on a basis of par ($100 per share) 10 per cent. to be paid in cash with the application, and 10 per cent. monthly thereafter, interest at the rate of 6 per cent. per annum to be allowed on all payments. Thus any payment made on account of the purchase of shares will earn interest at the rate of 6 per cent. per annum from the day it is paid in. Purchases under the instalment plan will be limited to 10 shares. Any shares paid for

Voting for Shop Representative

in cash will have right to dividends from date of payment. The stock that is thus being offered for purchase is exactly the same as that held by all the present shareholders without any restrictions beyond those applying to the present holders. The directors are greatly in hopes that under these favorable conditions, the employee shareholders will reach into the thousands instead of hundreds, as at present."

The Working of the Industrial Council

The industrial council and its workings is well set forth in a neat booklet prepared by the company. In short, the idea is that there shall be representatives duly nominated and balloted for in the various departments, with an equal number named by the management. The purpose is explained as follows:—

Massey-Harris Co., Ltd., and its employees, adopt this plan of a council in order to provide effective communication and means of contact between the employees and the management on matters pertaining to industrial relations so as to establish these relations upon a definite and durable basis of mutual understanding and confidence and to promote the common welfare.

The council shall consider questions of policy relating to wages, hours, employment and working conditions, works, practice and rules, safety and prevention of accidents, sanitation and health, and other similar matters of mutual interest.

For this purpose the employees and the management shall have equal representation on the council.

The council shall be concerned solely with shaping the policies of the company relating to the matters mentioned above. When the policy of the company as to any of these matters has been settled by the council, its execution shall remain with the management, but the manner of such execution may at any time be a subject for the consideration of the council.

The Organization of the Council

There shall be organized at each factory a council composed of representatives of the employees and of the management.

Employees shall elect from among their own number duly authorized representatives, to act on their behalf on matters of special interest to employees and of general concern to the company.

The management representatives shall be appointed by the management and shall not exceed the representatives of the employees in number.

The representatives of the employees and of the management shall have an equal voice and voting power in considering matters coming before the council. Through this council any employee or group of employees or the management may at any time present suggestions, requests or grievances with the certainty of a full and fair hearing. Matters which cannot be thus disposed of may, as hereinafter provided, by mutual consent, be submitted to impartial arbitration.

Number of Representatives

The basis of representation shall normally be one employee representative to every one hundred and fifty to two hundred employees, but in no case shall there be less than three employee representatives in the council.

Each works shall be divided into voting divisions in such a way that the several departments and crafts may be fairly represented.

In any works where 100, or over, women are employed there

Cafeteria of Massey-Harris Co., at Their Toronto Works—Capable of Handling 700 People—A Very Good Meal Can be Served Here for 22 Cents.

The Industrial Council of the Massey-Harris Co. in Session—Photo Taken at the Toronto Office at a Regular Meeting.

shall be a woman representative on the council, to be elected from among themselves, by the women employees who shall form a voting division for that purpose. Women employees in any works where less than 100 women are employed will vote for the men representatives in their respective voting divisions.

Who is Eligible?

Employees who are Canadians or British subjects by birth or naturalization, twenty-one years old or over, and who have been continuously in the service of the works for two years immediately prior to nomination shall be eligible for nomination as employee representatives. Provided that any time lost in military service, sickness or lack of employment for which the employee is not responsible is not to be reckoned.

Foremen, assistant foremen and other persons having the power of employment or discharge shall not be eligible for nomination.

Nomination and Election

Nominations and elections of employee representatives shall be by secret ballot and be held semi-annually in the months of June and December.

Nominations and elections shall be conducted by the employees themselves with only such assistance from the management as may be required.

All employees, both men and women, who are 18 years of age and over, shall be entitled to vote, except foremen, assistant foremen and other persons having the right of employment or discharge.

On the date fixed for nominations a secret vote will be taken. A blank ballot stating the number of representatives to be nominated from his voting division will be offered to each duly qualified employee present on the day of the nomination.

The employee will write on his ballot the name of the person he desires to nominate. If his voting division is to elect one representative, then one name shall be written on the ballot; if his voting division is to elect two representatives then two names, and so on.

Each employee will deposit his ballot in a locked box, carried by a scrutineer representing the employees who shall be accompanied by a time-keeper.

In voting divisions from which one representative is to be elected the two persons receiving the highest number of votes shall be declared nominated. If any voting division is to elect two representatives, then the four persons receiving the highest number of votes shall be declared nominated, and so on.

Three days after the voting for nominations has taken place the voting for election (by secret ballot) shall be held in the same manner as the voting for nominations, except that at the election only the names of the persons who have been nominated shall appear on the ballots and only these persons can be voted for.

The representatives of the management on the council will be appointed by the management promptly after the election of the employees' representatives. The number of management representatives on the council shall not exceed the number of elected employee representatives.

Method of Organization

The management will name a person to act as chairman of the council. A secretary shall be appointed by the works manager or superintendent of the works. Neither the chairman nor the secretary shall have a vote.

The company will provide at its expense places for meetings of the council and its sub-committees.

Employees' representatives on the council shall receive their regular pay from the company during such absence from work as this service actually requires.

Employees attending any meetings at the request of the council, or any sub-committee, shall receive their regular pay from the company for such time as they are actually and necessarily absent from work on this account.

How the Council Works

Any employee or group of employees who have been unable to make an adjustment of any matter with the foreman of the work on which he or they are engaged and who desire to bring such matter before the council may present it to the secretary of the council either personally or through their representative. The secretary shall first ascertain whether the matter has been properly presented through the proper channels

to the superintendent, and if not he will see that this is properly done.

If the matter is not satisfactorily disposed of in this manner, the secretary shall submit a written statement of the matter to each member of the council at least three days before the next regular meeting.

Any employee or group of employees thus referring a matter to the council shall have an opportunity to appear before it and present the case. Any such group of employees shall select not more than three spokesmen from their own number to appear before the council.

The council may call any employee before it to give information regarding any matter under consideration. The council, or any sub-committee appointed by it for that purpose, may go in a body to any part of the works to make investigations.

When the council reaches an agreement on any matter, its recommendation shall be referred to the works manager and superintendent for execution, except that if the works manager and superintendent considers it of such importance as to require the attention of the general officers, it shall be immediately referred to the President of the company who may either approve the recommendation of the council and order its immediate execution by the works manager and superintendent or proceed with further consideration of the matter as hereinafter provided.

In case of a tie vote in the council it shall be in order to re-open the discussion and to offer substitute or compromise recommendations, on which the votes shall be taken in the same manner as above provided.

Further Provisions

If after further consideration, the vote in the council remains a tie, then the matter shall, at the request of either the employee representatives or the management representatives, be referred to the President of the company.

The President, or his specially appointed representative, may confer with the council as a whole or any sub-committee thereof, or any group of employee representatives, at such time and place and in such manner, as in his opinion, will best serve to bring out all the facts in the case.

Within ten days after the matter has been referred to him, the President shall either:

(a) Propose a settlement thereof, or

(b) Refer the matter directly to the general council to be formed as hereinafter provided for.

If the President proposes a settlement and it is not satisfactory to a majority of the employee representatives, and if after a further five days, no agreement has been reached, then the President may, if he deems advisable, refer the matter to a general council to be formed as hereinafter provided.

If the President decides not to refer the matter to a general council, or if upon reference to the general council the vote is a tie, then the matter may, by mutual agreement of the President and a majority of the employee representatives, be submitted to arbitration as hereinafter provided.

The General Council

Whenever in the opinion of the President any matter coming before any council affects other works of the company or the works of our affiliated companies, the Verity Plow Co., of Brantford, and the Bain Wagon Co., of Woodstock, he may call a general council and thereafter the local council shall take no further action thereon.

In the formation of a general council the works of the Verity Plow Co., Ltd., at Brantford, Ont., and the works of the Bain Wagon Co., Ltd., at Woodstock, Ont., shall be considered as units or works of the Massey-Harris Co., Ltd.

The general council shall be formed in the following manner: —The President shall issue a notice designating the several works which he deems jointly interested. Thereupon the employee representatives at each of the works designated shall elect two or more of their own number to act as members of the general council. There shall be one such member of the general council for each 500 employees or major fraction thereof except that no works shall have less than two employee representatives in the general council.

The management representatives in the general council shall be appointed by the President and shall not exceed the number of employee representatives.

Reasonable travelling expenses, including hotel bills, of representatives serving on a general council, shall be paid by the company.

If the general council is unable to reach an agreement as to any matter it may, by mutual agreement of a majority of both the employee representatives and the management representatives, be submitted to arbitration.

All decisions of any general council or of any arbitrator or arbitrators shall be binding upon all the works originally designated by the President as being jointly interested. Any such decision may be made retroactive.

Independence of Action

Every representative serving on any council or general council shall be free to discharge his duties in an independent manner

The Noon-Hour Crowds Pouring Into the Massey-Harris Cafeteria—Patronized by Men and Women Alike.

without fear that his individual relations with the company may be affected by any action taken by him in good faith in his representative capacity. To insure to each representative his right to such independent action he shall have the right to appeal directly to the President, the council, or the general council, for relief from any alleged discrimination against him, and if the decision is not satisfactory to him, then to have the question settled by an arbitrator selected by mutual agreement.

The representation of employees herein provided shall in no way abridge or conflict with the right of employees to membership in any labor or other lawful organization.

The Massey-Harris Cafeteria

To the man who has become accustomed to looking for eating places in the down-town section of the larger centres, the bill of fare that is hung up in the Massey-Harris Cafeteria looks as though the prayer of the poet had been answered when he asked, "Backward, turn backward, oh Time in thy flight." For here he sees in front of him the makings of a perfectly good dinner for between 25 and 30 cents. When you go into the average restaurant down-town you pay for what you eat at a pace quite in keeping with the best traditions of the high cost of living. But here is what the writer saw in the Massey-Harris place:—

Vegetable soup	5c
Fried fish	12c
Baked beans	10c
Meat pie	12c
Potatoes	3c
Green peas	4c
Cake	5c
Pie	5c
Tea or coffee	3c
Milk	5c
Ice cream	5c

Bread and butter are free.

Just out of curiosity we noted the prices that were charged in one of the much-patronized down-town restaurants, comparing them with the Massey-Harris list. The helpings at the latter place are not skimpy. They are as large, or larger than one gets in the down-town section. But here are some of the prices compared:—

	M.-H.	Down-town
Soup	5c	20c
Fried fish	12c	35c
Baked beans	10c	35c
Meat pie	12c	35c
Green peas	4c	10c
Cake	5c	10c
Pie	5c	10c
Ice cream	5c	10c

Here, then, are eight items that Massey-Harris sell for 58 cents, while the down-town places get $1.65 for the same items. What's the difference? Simply this. The Massey-Harris Company do not plan to make a cent out of their cafeteria. They are satisfied to break even. Whether they do or not I am not prepared to state, nor would the officials say so. And the big eating house on King street is the equal of anything to be seen down-town. It will take in a crowd of between seven and eight hundred. The service is quick and the food good. Everything is clean, bright and attractive. Canary birds in cages are to be seen at a couple of dozen points. There is a rule to restrict smoking until 12.25, when the men are at liberty to light up and blaze away with their tobacco. There is a small stand in the room where tobacco can be secured, and also a few of the leading and more approved sorts of confections. No money is made on these sales, the idea being to break even on them. The chairs used are the variety seen in the lunch-rooms with the arm of the chair converted into the table. A number of square tables seating four are also to be noticed. These not only serve the purpose of a place to eat, but as soon as this is done with they are in demand when the pack of cards is brought out for a few hands before the noon hour is over.

In behind the scenes everything around the place is clean and bright and sweet. Good, plain ingredients are used in the preparation of the food, and all the cooking is done under wholesome conditions. There are no dark, smoky kitchens, no back lanes with garbage cans at the door. The cooking for this big factory dining-room is done with as much care and attention as could be given any place. The way in which it is patronized is the best evidence that it is a square deal and a success.

A cubic inch of coal pulverized so that 95 per cent. will pass through a 100-mesh screen will contain over two hundred million particles, none of which will be greater than one one-hundreth inch cube, and a larger percentage will be less than one six-hundreth of an inch cube.

A simple cable conductor has been in use for some time past, in Germany and other European countries. It consists merely of a flat metallic tube in which a series of notches are made with a special tool, after the two ends of the cable to be joined are properly inserted. The contact is said to be perfect, and the grip is such that the cable breaks before the connector gives away.

Montreal has a street cleaning device which sweeps the dirt to one side of the thoroughfare, where it is taken up by suction into a machine following up. Another feature of the road-sweeping scheme, is that sprinklers in front of each machine lay down the dust. Proving that ingenuity and machinery in unison make a wonderful combination.

Noise has no terrors for the new Magnavox anti-noise transmitter, which was used on all the airplanes of the United States Navy. This device was patented nearly two years ago, but only recently released for commercial purposes. No helmet is necessary for the listener, but still the voice is distinct whether one or one hundred miles away. E. S. Prideman, and P. L. Jensen are the inventors of this interesting telephone aid.

Nearly all animals are said to be better swimmers than man, and to take to the water naturally. The rhinoceros and hippopotamus are wonderful swimmers and divers, while the Indian elephant crosses great rivers with heavy loads. The elk keeps its head above water and crosses directly from bank to bank to avoid turning. The reindeer, on the other hand, turns as often as it likes, keeping its head only a little above the water. But of all swimmers, of all climes, the best, though not the swiftest, is the polar bear, which passes half its time in the water, swimming and diving.

The Eiffel Tower, the tallest structure in the world, was erected by Alexander Eiffel, a French engineer, for the exposition of 1889 at Paris. It stands in the Champ de Mars, and is 984 feet high (429 feet higher than the Washington Monument). The base is a square of 112 yards, from each corner of which rise the four curving supports of interlaced iron-work. At a height of 590 feet these merge into a single shaft. There are three platforms at various heights, to which the ascent is made by elevators or staircases—1,927 steps in all. The total cost was over $1,000,000, of which the State contributed about $300,000. In 1909 the Tower became the property of the City of Paris.

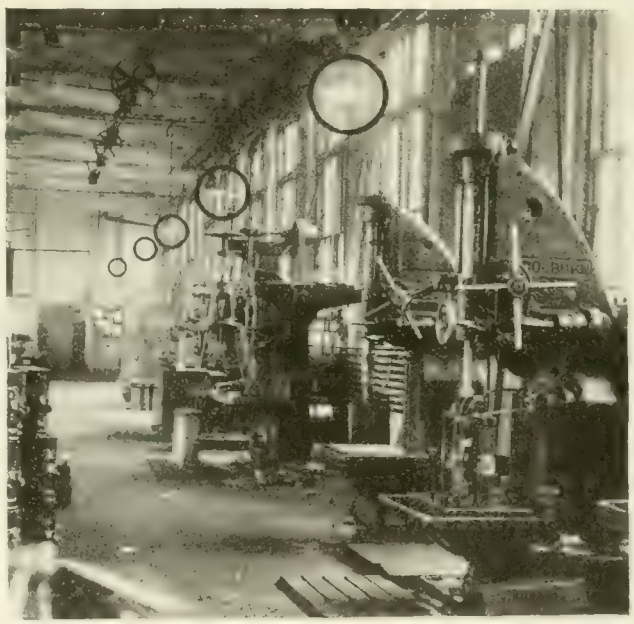
The Science of Efficient Shop Illumination

The Subject of Shop Lighting is a Very Vital One, For Without the Proper Illumination, Workmen Cannot be Expected to Produce Results, Either From a Quality or Quantity Standpoint

By A. W. SWAN

A GREAT deal has been written on the subject of illumination, usually with a free use of technical terms, and sometimes rather confusing to the non-technical manager and superintendent who are interested in having good lighting conditions in their plants. Further, the special bulletins issued by the electric manufacturing companies, while filled with very valuable material, usually recommend the installation of some form of semi-indirect or indirect lighting, which is as a rule expensive to instal. Now, it is quite possible to have a very efficient lighting scheme, and having nearly all the advantages of the more expensive schemes, at no advance in cost over the ordinary shop lighting scheme, simply by re-arranging existing units.

The science of shop illumination, reduced to its elements, is simply a matter of two factors, illumination per square foot, and absence of glare. The illumination per square foot depends again on two factors, the distance apart of the lamps and the power of the units. Taking illumination first, the choice is evidently between having low-power units close together or high-power units farther apart. While the general illumination is more uniform with the first system, it is also very expensive from the renewal standpoint; on the other hand, with very high-power units, such as the arc lamp, the difference between the best-lighted sections and the poorest-lighted sections is very great, and this is of great importance in the machine shop. Although it is sometimes possible to arrange for a machine shop being lighted entirely without the use of drop lights at the machine tools, this is not as a rule possible in the ordinary shop with its belting, etc., and low-power drop lights are necessary at the individual machine tools, particularly where the work is at all fine. At the time of the Russian 75-mm. shell contract, which was distributed throughout the Eastern States in 1916, the Government inspection bureau was not allowed to work in the evenings, although the lighting was excellent; and where parts are ground to limits of 1/1000", for instance, it is evident that even with the best general illumination, there must be provision for drop lights at the machine.



NOTE THE POSITION OF THE LIGHTS.

From all these standpoints it appears that a shop lighting system having 200-watt lamps for main lighting, with 25-watt drop lights has much to commend it, and as a matter of fact, this is a system in general use. But it is one thing to have the right power lights, and another to have them spaced correctly. The average machine shop has the machine tools arranged in aisles back-to-back; the lights are conveniently arranged with one row per double row of machine tools. Without going into the matter of candle-power per square foot, it will be found that with a spacing of 15 ft. between rows, having the lamps 15 ft. apart in the rows gives very satisfactory results in the ordinary machine shop.

The principal objection raised to the use of bare lamps, particularly of the modern high-power Mazda, is that they cause glare. However, this objection can be met by suspending the lamps at the right height and using the correct reflectors. The sensation of glare is caused by looking directly at any very brilliant object, therefore, any lamp of high brilliancy coming within the ordinary range of vision must be shielded from direct view. But the ordinary range of vision is not far from the horizontal, any very brilliant light directly overhead, or almost directly overhead, does not cause much trouble from glare as it is outside the ordinary range. On the other hand, owing to perspective, the further off the object the nearer it is to the apparent level of the eye; or in other words, a bare light which will not be annoying to the workman almost directly underneath will be troublesome to his neighbor further down the shop. It follows from this that if bare lamps are used, they must be used with some type of reflector that will shield them from those not directly beneath them. This is readily accomplished by the use of flat bowl reflectors, where the edge of the bowl is slightly below the tip of the lamp. Such a reflector cuts off no light from those directly beneath, but the lamp is above their normal range of vision, and will cause little annoyance. On the other hand, the reflector bowl will shield the eyes of workers in other parts of the shop. An important point is, of course, that the that the lamps should be suspended at the correct height; if too high, the reflectors will have to enclose the lamps more than at a moderate height. As a matter of fact, the best height both for general illumination and lack of glare seems to be about 10 feet.

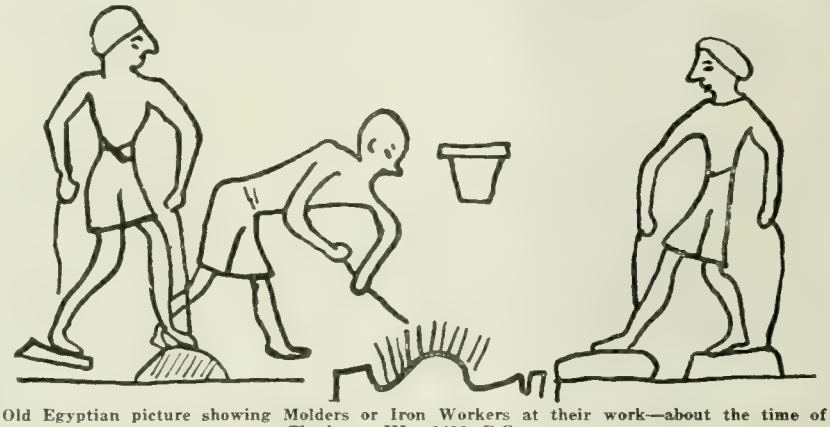
The accompanying photograph shows plainly the type of installation described. It will be noticed that the flat bowl reflector cuts off all direct view of the more distant lamps, and even in those nearer, only the lower part of the lamp bulb is visible. Those almost directly overhead would be visible, of course—if one cared to look at them, but the range of the camera represents quite well the normal human range, and any lamp that cannot be seen in the photograph is not likely to be harmful.

Of course, such an installation leaves a good deal to be done in the way of providing perfect illumination; glare can never be avoided where bare lights are used, but the installation illustrated gives very good results; it is very economical—the reflectors are of metal and practically everlasting, and the general effect is quite pleasant.

Making *Foundry* More Attractive

BETTER and More Wholesome Shop and Working Conditions Would Do Much to Make the Foundry a More Attractive Place in Which to Work.

By F. H. BELL,
Editor Canadian Foundryman



Old Egyptian picture showing Molders or Iron Workers at their work—about the time of Thothmes III., 1490 B.C.

IS there any good reason why work in a foundry should not be carried on in surroundings far more cleanly, bright and wholesome than in the majority of shops at the present time?

It is a hard matter to get apprentices for the foundry. Men who are in the trade do not, in many cases, advise their boys to follow in their footsteps.

What is the remedy? Why not consider better shop conditions, better ventilation, better facilities for the handling of heavier work?

There has been a falling off of moulding shop apprentices—almost to the zero point in many cases, and some of the large employers go as far as to state that it will be a matter only of a few years until the molding business is largely in the hands of foreigners.

In order to properly comprehend the significance of the subject under discussion, it would be as well to first consider the origin of the term "foundry," which has its derivation in the word "found"—to begin, to establish, to originate, to endow, etc. Thus a foundry is a place where things are begun, or established, or originated, or endowed, or in other words, where they are founded. The man who operates a foundry is a founder because he does founding, which is to say, he produces the foundation on which the machine, or implement, or device is founded or built.

From time immemorial the founder has held a prominent place in providing mankind with implements of every description, but never to a greater extent than to-day; the only difference being in the manner in which his services were appreciated in olden times compared with what they are to-day.

Undoubtedly the metal workers spoken of in the Scriptures and in other ancient histories were founders in the same sense as the term "founder" is used to-day, notably they melted their metal and poured it into molds rather than forging it into the required shape. Wrought iron, which is to say, "worked iron," is the product of later ages and is of comparatively modern origin.

Goldsmiths, silversmiths, coppersmiths, etc., were of necessity melters of these metals, so likewise were all the workers in metals of any kind, all of whom bore the name of "smith." The esteem in which the metal-"smiths" were held and the extent to which the trade was practised may be judged by the extent to which the name smith has been perpetuated. The smiths of ancient days were of no greater necessity than the molders and founders (as they are now known) are to-day, and if they are not now held in the same esteem as formerly the fault rests entirely with themselves, and the object of this letter is to interest, not only the managers of foundries, but those who are employed therein, either as practical molders or helpers, or in any way connected with the foundry.

Some of the Old Methods

Of the methods employed by the ancient smiths, or the shop equipment at their disposal we have very little knowledge, but the Egyptian wall painting shown in the engraving in the heading probably gives as reliable an idea as can be found. The fire was built in a slightly depressed place in the ground; a forced draft was given to the fires by an attendant on either side, who worked the bellows which were placed on the ground in such a manner that they would blow the fire. The attendants worked the bellows by standing on them and alternately throwing their weight from one foot to the other and pulling up the bellows with a rope as the weight was relieved, thus permitting the instruments to be filled and emptied alternately. The little figure opposite the smith's head was probably for fuel or water.

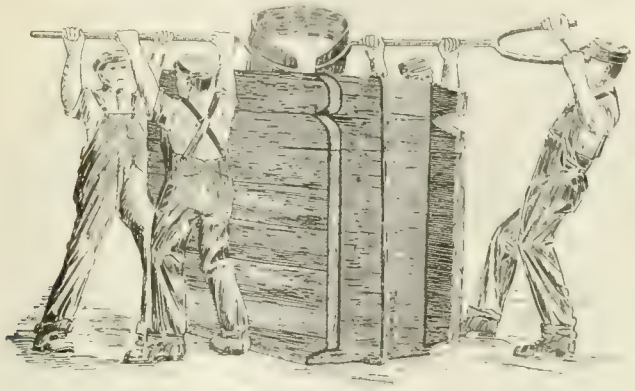
The smiths of those days, no doubt, worked hard and became tired, but the work was likely done out-of-doors, and the men would work up healthy appetites and restful sleep. The present-day molders are placed in a different position and should be treated with even more consideration.

The Molder of To-Day

As things are now, to be a first-class molder and founder is an accomplishment which, as has been frequently pointed out, calls for several distinct characteristics in the makeup of the man. He must be physically able-bodied and muscular, otherwise the work will be a lifelong drag. He must, like all other craftsmen, be mechanically inclined, else he will never be able to comprehend the "why and wherefore" of the different traits or features of his trade. He must be artistically inclined, otherwise he will not be able to make such jobs as have to be done without a perfect pattern, and if his aim is to be a top-notcher, capable of taking charge, he must be in the scientific class in order to master the intricacies of the furnace in the melting of his metals.

To secure boys who will ultimately emerge from their apprenticeship with all of these natural propensities properly developed and with a will to enter upon life's journey in the foundry, the foundryman must realize that he has on his hands a problem which will be hard to solve unless he makes the environments of the foundry such as will attract the proper class of boys. It cannot be expected

that in this 20th century, when so many opportunities are offered to the youth of our country that young men and boys can be found who will voluntarily tolerate a life such as the molders of the immediate past were wont



HOW HIGH MOLDS ARE USUALLY POURED.

to endure. The requirements of the present and the future are that the foundry must be kept up to the same standard as other industrial institutions both as regards healthy surroundings and labor-saving equipment.

The Place of Machinery

The expression "labor-saving" can be translated into two different conceptions. The one is to utilize machinery to replace the man wherever an opportunity offers, while the other is to make the necessary labor of the man the least laborious possible. The first conception is usually adopted by the modern foundryman while the latter is

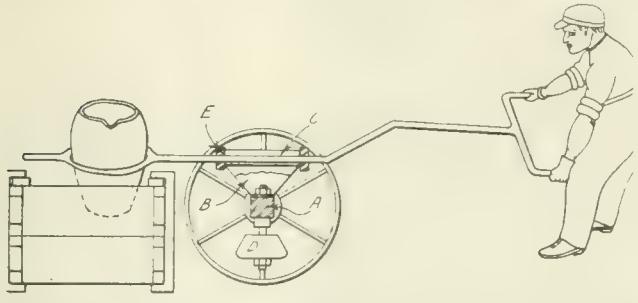
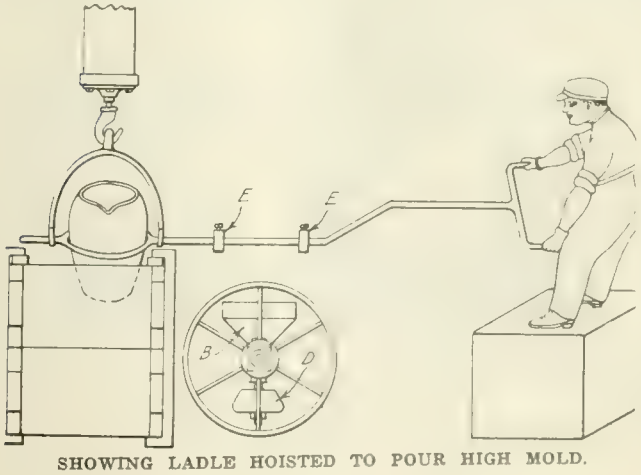


FIG. SHOWING SUPPLY LADLE ARRANGEMENT. A IS THE AXLE. B IS SUPPORT FOR SHANKS. C IS SLAT IN WHICH SHANK RESTS. D IS WEIGHT TO KEEP B IN PROPER POSITION. E IS COLLAR TO KEEP LADLE IN PROPER LOCATION.

seldom considered. There are many improvements which could be introduced into the foundry to make it more attractive, and now that the reconstruction period is at hand and the world must needs be run on a different basis, the foundry must take its place with the others and wake

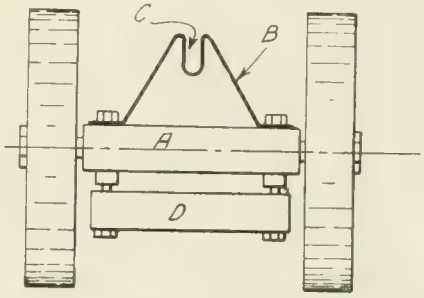


SHOWING LADLE HOISTED TO POUR HIGH MOLD.

up. Labor-saving appliances which will increase the output of each man will, of course, always be in order but the desire of the writer is to inspire interest in the installation of labor-saving devices for the saving of the labor exacted from each man. Perhaps a few illustrations of what molders have to endure would make more clear the need for improvements.

Things That Should Not Be

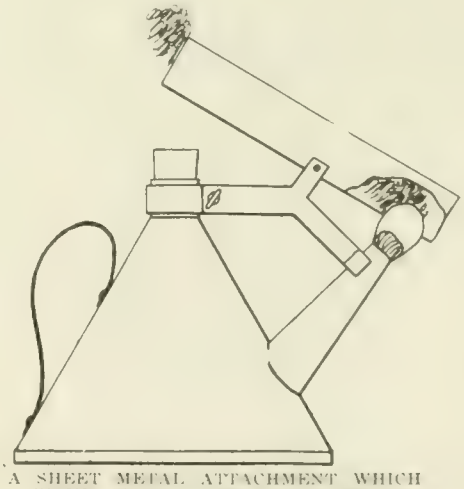
In Fig. 2 will be seen a common way of pouring a high mold. A cable hanging over a grooved pulley attached to the roof would be an improvement to this, but inexpensive pouring devices are on the market which can be used on jobs such as this or they can be used for pouring snap molds. Sulky ladles similar to Fig. 3 are in use in a limited number of places, but should be more generally used. They are so arranged that they can be used in pouring molds of from a few inches high up to 18 or 20 inches, or they can be lifted from the wheels by any kind of a device and used for pouring very high molds. In Fig. 4 is a sample of what the molder



SHOWING END VIEW OF DETAILS.

has to put up with in many a foundry. These foundry torches are actually on the market for molders' use. They consist of an iron oil can with a wick made of several strands of candle wicking shoved down into the spout, a bon-fire is lit on the end which sticks out, and as it burns away it is pulled up with the assistance of a nail.

Pages might be written on what could be done to ease the molder's burden, but the molder can do his



A SHEET METAL ATTACHMENT WHICH WOULD CARRY AWAY THE SMOKE.

share of work if the shop is made fit to work in. "Cleanliness is next to Godliness" and it is as easily accomplished in the foundry as in the office. The first thing to do is to clean it up, after which keep it clean. Wash the windows and keep them washed. Repair the broken windows and the misfitting doors and keep them repaired, and put in a proper heating and ventilating system.

In Fig. 5 will be seen a ventilator such as can be used

in the gable. These ventilators are used in rubber factories, tanneries, soap factories and kindred places for the purpose of carrying off foul smells, and if used in the foundry would carry away the gas and smoke and dust, so that the men could work in comfort, and also that the shop would fill up with fresh aid which could be properly heated. If a little more consideration were given to the systematizing of the working programme it would be quite possible to make it pleasant for everyone concerned.

No molder should ever be allowed to shake out or cut over sand heaps. This does not mean that he is handing over the hard work to some less fortunate person. It simply means that if a fresh man with a dry shirt comes into the shop after the molders are gone he can open all the doors and windows and start the rotary ventilator and suck all the steam and dust out of the shop. This will not do him any harm because he has not been sweating and he is amply working as though out of doors.

Once the foundryman awakens to the need of labor-saving devices not only to take the place of the men he dispensed with but also of labor-saving and health-saving devices for the ones he retains, he will have no further need of fear regarding his future supply of molders. Even though the molding machine became so perfected that a common laborer could do certain jobs, it must be borne in mind that the commonest kind of a common laborer is generally pretty hard pressed for employment when he hits the foundry, but

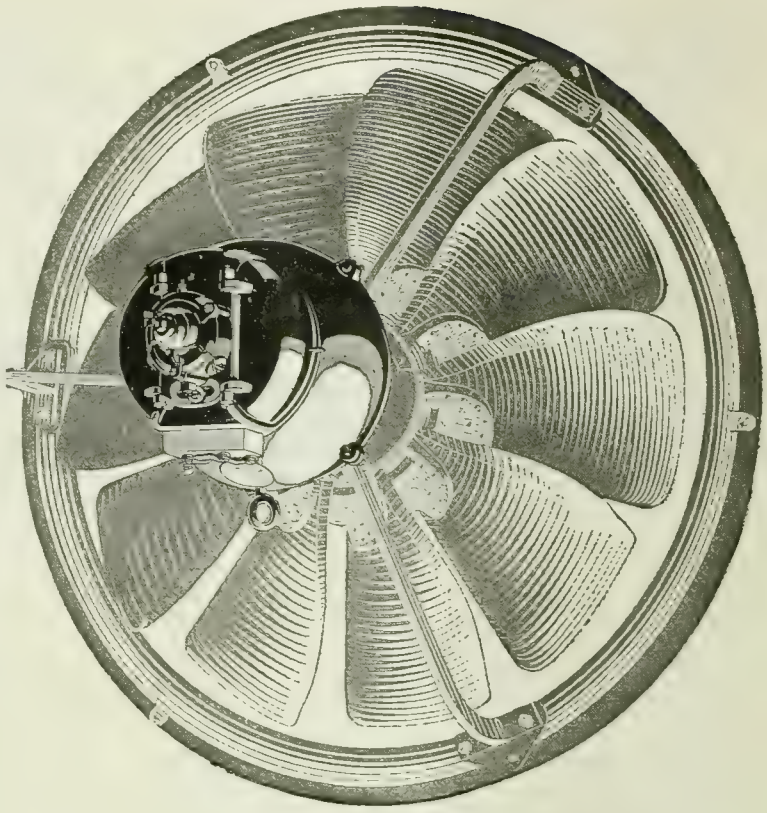
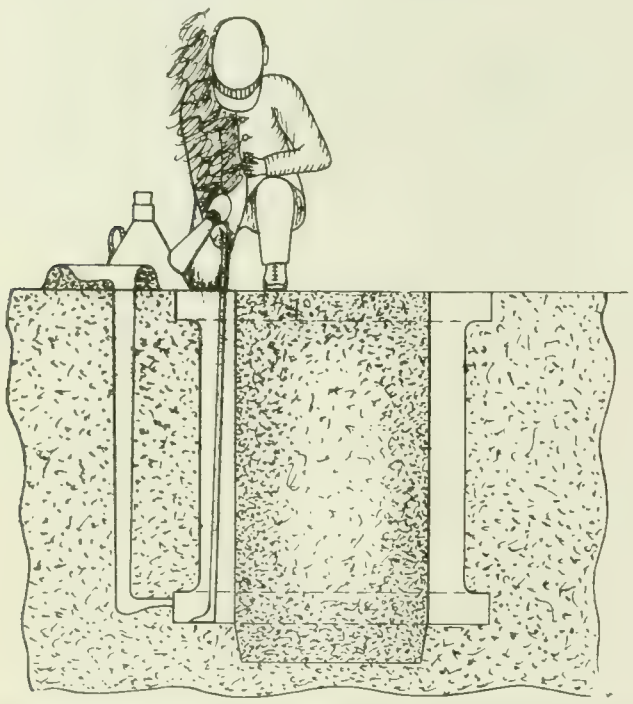


FIG. 5 –TYPE OF VENTILATOR THAT WOULD MAKE BETTER CONDITIONS IN THE FOUNDRY.



THE USUAL METHOD OF LIGHTING A DEEP MOLD. THE FUMES FROM THE OIL LAMP ALL COME UP IN THE MOLDER'S FACE.

there is certainly no excuse for this state of affairs as foundry work is one of the noblest and most interesting of occupations.

A cubic inch of solid coal has a superficial area of 6 sq. in.—but the combined area of an equal weight of pulverized coal is over 30 sq. ft. or an increase in area of approximately 700 times.

It often happens that some obstruction prevents the turning of a monkey wrench though the jaws fit the nut. A novel form of adjustable wrench has its head pivoted in the handle, with a ratchet connection. This not only allows the tool to be used at eight different angles, but makes effective even a very limited movement of the handle. The ratchet, which works either way, is locked or released by pressing on a small dog located where the user's thumb naturally rests.

—"Evening News" (London).

SHE'S SORRY NOW SHE PATTED IT.

Holland is finding it is easier said than done to get rid of the ex-Kaiser.

Do You Know Exactly What Your Product Costs?

Suppose You Were Asked the Question Stated Above, Could You in All Honesty State a Definite Figure Showing Your Loss or Gain? If You Cannot, There is Something Wrong

IT is not the writer's intention to carry readers through a long-winded dissertation on production figures, nor does he intend going into any elaborate system of keeping track of such costs, but it is his intention and purpose to place before readers in as concise a manner as possible a series of graphical solutions to the cost problem.

Before touching on these graphs, however, let us consider for a moment what we mean when we speak of the cost of a product.

The essential aim and incentive of all manufacturers is to turn out their product at the greatest possible profit. This, of course, is exactly as it should be, but once more let us consider just what the word PROFIT means.

In the writer's opinion it is the difference between the selling price and the manufacturing cost of the article, irrespective of the nature of the article. The selling price in turn is based on the production cost, therefore to sell intelligently one must know thoroughly and accurately the cost of manufacture.

There are, however, some executives still left who stick to the old rule-of-thumb method, namely, to sell their product at some certain price, simply because their competitor does so, or worse still, to sell just a little lower than their competitor, with the idea of grabbing up all the orders.

The worst feature of all is that this method is usually adopted without any certain knowledge of costs. True they may assume certain factors, but they have no proven facts to set their prices from.

The chief reason for this pitfall existing, is the fact that the importance of a proper cost system is seldom properly realized in any plant. However, the day of watching the production cost is dawning, for interest is awakening as never before. Everywhere cost systems are being installed, and to-day there are few executives who do not at least possess the desire for a common-sense cost system. The chief trouble, however, seems to be in judging what a cost system really is.

FIG. 1.—ILLUSTRATING HOW THE PLANING COSTS SHOWED UP.

The Fear of Red Tape

Often the fear of red tape, and the expense of maintaining it, deter too many from obtaining the goal of their desire. It is this very fact that accounts for so many unfinished, half-hearted attempts at cost systematizing at the present time.

There is no need of such a condition, for an effective and proven cost system can be easily maintained, if properly introduced. The clerical costs need not be high.

From this the writer does not infer that you hire cheap help, for such an idea is suicide to any cost system. Above all, secure competent men to handle your system, but watch that your system is kept within reasonable limits, and not made up of useless red tape. It is this dividing line which defines the real useful cost scheme from the elaborate, one method to cover all ideas.

There never was, and never will be one system to cover all branches of the trade, for each business has certain operations, and peculiarities, which must be met with, but from their own particular standpoint and angle.

No matter what the business, however, the executive sitting in his office examining the cost charts, should be able to visualize the shop conditions which they refer to, not alone the machines, but the men, the operations, and the materials, etc.

In this way loss of labor, careless expenditures, waste of material, poor equipment, losses of profit, and other matters, are brought clearly before the executive's eyes. Without a good cost system these matters would often take a long time indeed before cropping up for attention.

To get the very best value from any cost system we must first have a practical knowledge of the product, and its procedure of manufacture. The price of material, shop conditions, etc., must all

be thoroughly gone into, before attempting to start a rational method of keeping track of the work.

When a cost system is finally in operation, there is one essential to its success, and effectiveness, which is too seldom considered, namely, co-operation of the executive organization.

One Man Control Impossible

In a plant of any size it is impossible for one man to keep under his control all decision and action. He must gradually allow his subordinates to perform certain duties, as they show ability, which is only as it should be, for in this way each member will take a personal interest in the system's success.

There has been many a good system thrown into the discard through lack of co-operation.

Another evil which has caused the downfall of many a good cost system is that of impatience. By this the writer means impatience for results. Rome was not built in a day, we are told. Therefore it stands to reason that the same principle holds good for a cost system. Suppose, for instance, we take two plants, the first of which, although it adopted no cost system, still tried as much as possible to run on a systematic basis, the second never believed in cost systems, and what was more, believed any sort of system pure bunkum.

Which plant would show the quickest results providing a cost system was adopted?

Naturally, readers will say the first, because this shop was at least partly systematized, yet there are some people who would claim that each should show equally prompt results.

In other words, the worse condition the plant is in, previous to the adoption of the system, so in like proportion will the results take to show themselves. In the ordinary shop at least a year of hard work, and co-operation, is necessary to bring about tangible results.

The writer strongly emphasizes the point, namely, that no system, no matter how good, can work miracles. If previous to the installation of such system, the trend of work was carelessly attended to, it is only to be expected that some time must elapse before conditions change for the better. Common-sense will tell us that, and yet many a system has been thrown out because in a month's trial no appreciable result had come to the surface.

What then constitutes a correct cost system?

The writer would say, one which is a proven cost system, so arranged that we actually know and see direct benefits, not theoretical ones.

It often happens that some scheme, tried and proven successful in another plant, can by intelligent understanding of its basic principle, be so arranged and adapted to be successful in another plant, but in every case it should be recognized that we cannot take some system holus-bolus out of one plant, and dump it into another altogether different line, without some modifications.

Before going into the subject of graphs, let us consider one more point, namely, the correct type of man to handle such a system.

The writer personally believes the correct party for such a position is an efficiency engineer—but wait (for in my ears I hear numbers saying, "What, an efficiency engineer? Not on your life! I've been stung once—never again.") Unfortunately, many have been hoodwinked by so-called efficiency engineers, but were they? In other words, what constitutes the make-up of a **real efficiency engineer?**

Webster defines efficiency as follows: "Of being efficient, or producing an effect or effects, power or action. The

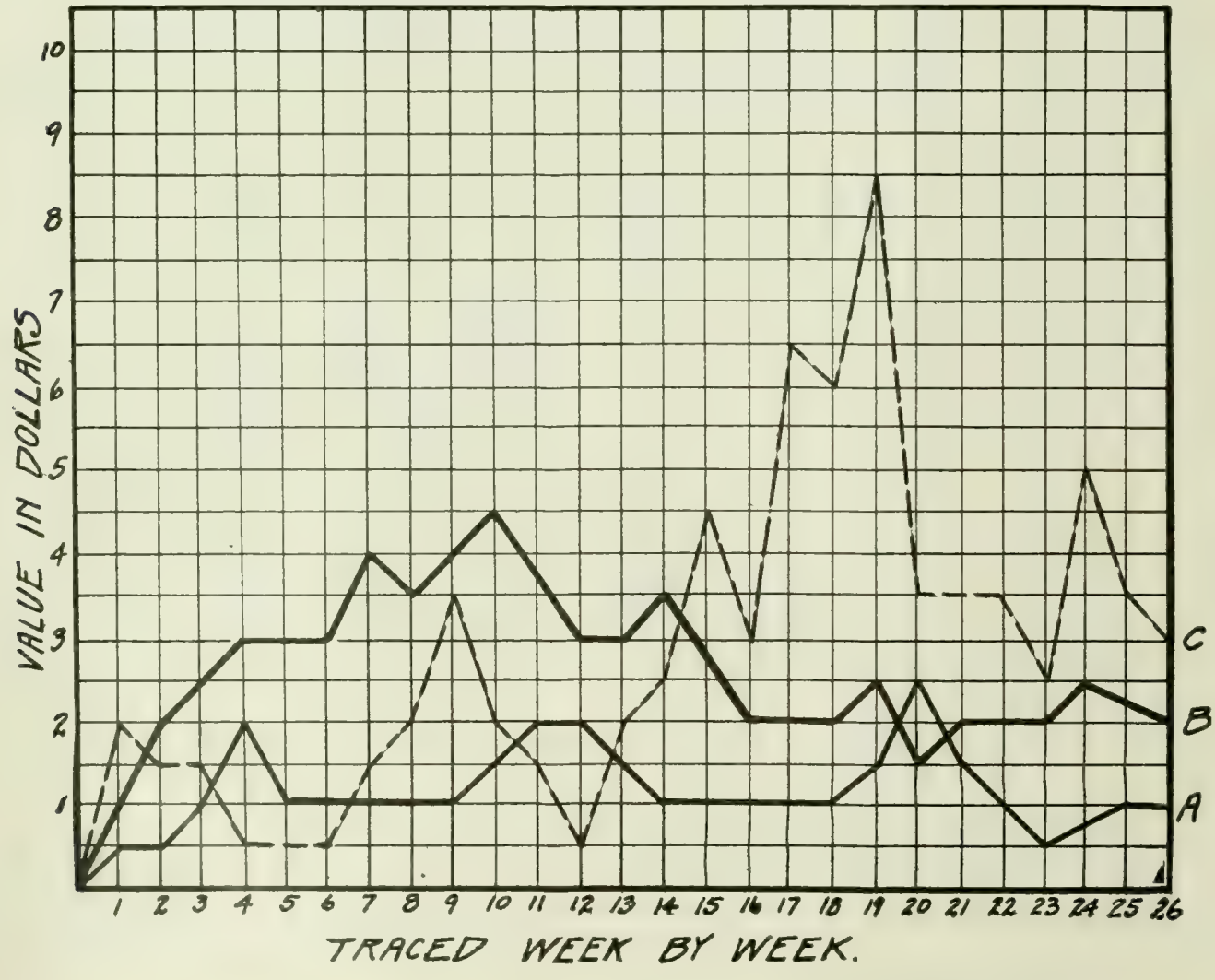


FIG. 2.—SHOWING UP CLEARLY THE WASTE IN MATERIAL BY THREE DIFFERENT DEPARTMENTS.

energy or work that is got out of a machine," etc. We could go on indefinitely—but the main theme is results to a maximum point.

To obtain maximum results from all angles, the engineer must first be a practical man, who understands that these angles exist. For instance, we could not expect a man who has sat over a desk in a wholesale grocery office, to leave his position, step into a large machine plant, and bring this shop up to a maximum producing point, providing it was in bad shape of course.

This parallel may seem ridiculous, yet there are some fellows posing as efficiency engineers who have tried to rearrange business concerns, whose policy they have not even been familiar with.

The writer personally knew of one chap who was a machine efficiency expert (?). This fellow talked good, had a splendid appearance, and sure held the bluff down fine. This we give him credit for.

To see him stand at a machine chat-

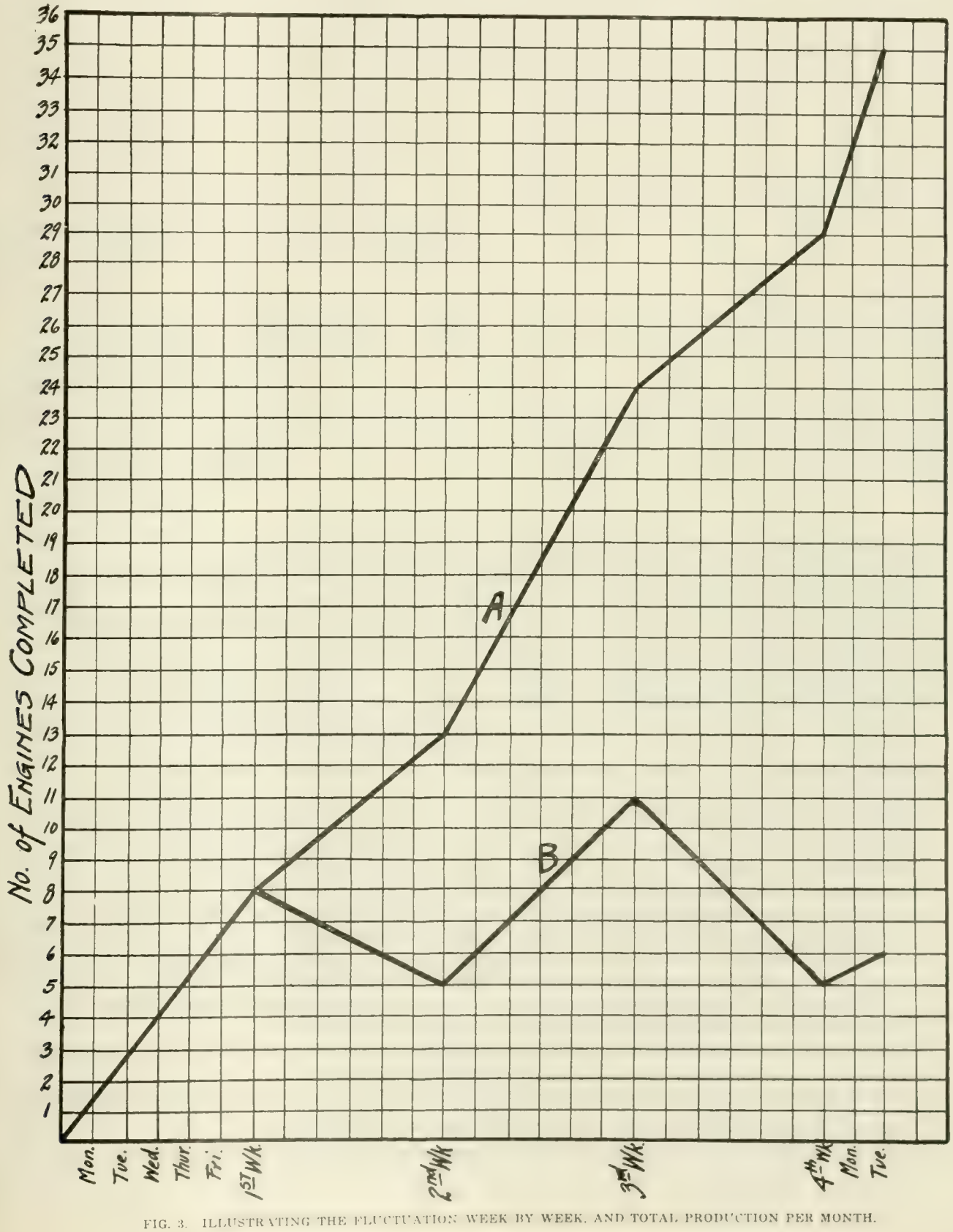


FIG. 3. ILLUSTRATING THE FLUCTUATION WEEK BY WEEK, AND TOTAL PRODUCTION PER MONTH.

ting with a man was a treat. The operator felt good, so did the engineer, for he had his stop watch on the go at the proper moment, and later figured out the time of operation. It took the workmen some time to figure out why their time was being cut, until they suddenly caught Mr. Efficiency red-handed. Of course what happened is obvious and natural. They beat him up, which he deserved.

Granted that first this firm was wrong for employing such a method, and man, and second, that such a party as spoken of is a bad example, yet the point is this, that previous to his position with this firm he had run an Ice Cream Store, and read up books on the subject of efficiency in the meantime.

He went back to his business where he belonged, and his wife who had kept store for the time being scrubbed her floors once more.

But all this is deviating from the main point, namely, what is an efficiency engineer? In the writer's opinion it is a person thoroughly acquainted with all the ins and outs of the business which he proposes bringing up to a high standard of efficiency. A good practical man. If it is in the engineering line, he should be a thorough, highly educated mechanic, both in theory and practical knowledge. His scope should include the pattern shop, foundry, machine shop, routing in all its phases, etc., etc. It is the fact that he possesses these qualities, which distinguishes him from the ordinary mechanical superintendent, who might be an ideal mechanical man, but mighty short on theory, and lacking in imaginative qualities.

Taking it for granted that readers are in accordance with the writer, we will go on with the subject of graphical solutions of manufacturing cost. No attempt will be made to show a complete cost system. Such an article would cover more space than herewith laid out, but we will cover important ground with the following five graphs, or charts as they might be called. For illustrative purposes the writer has drawn on his personal experiences in the gas engine, and machine tool trade, and quotes figures which he has actually proved to be correct, practical figures, and not merely theoretical. This is especially true of the chart showing the difference in costs, with and without jigs, for the work.

In a certain manufacturing concern, producing a well-known type of machine tool, the cost was proving exceedingly high. No actual trace was being kept of these costs, but the end of the year showed plainly something was radically wrong, so the result was that charts were prepared of the various operations throughout this tool's manufacture, to see where the trouble lay.

Planing, shaping, drilling, milling, assembling, etc., etc., were all covered, and figure 1 illustrates how the planing operation showed up. These machines were (as is usually the case) turned out in batches under various numbers. The graph was made to accommodate this fact. Referring to the illustration we see that on the vertical scale we have the cost in dollars, while the horizontal scale is marked A.B.C.D.E.F. Each of these letters represent an order number, and of course a batch of machines.

From a low record cost of $60.00, these costs soared to $139.00. Impossible you say—yet such was actually the case. Of course after seeing such results, trouble ensued, and no wonder, for plainly something was very far wrong. It later developed that the planer hands were not evenly matched as regards ability. Readers might reasonably enquire—then why were they allowed to stay? This also cropped up on further enquiry, namely that they were friends of the foreman's. All this sounds fishy, but it actually happened. For obvious reasons the writer cannot give this definite information.

Of course this state of affairs was remedied at once, with the result that the operation cost became normal once more and stayed there. Without some cost system, this item would have been exceedingly hard to trace, in fact might never have been traced to the exact source where most of the trouble lay.

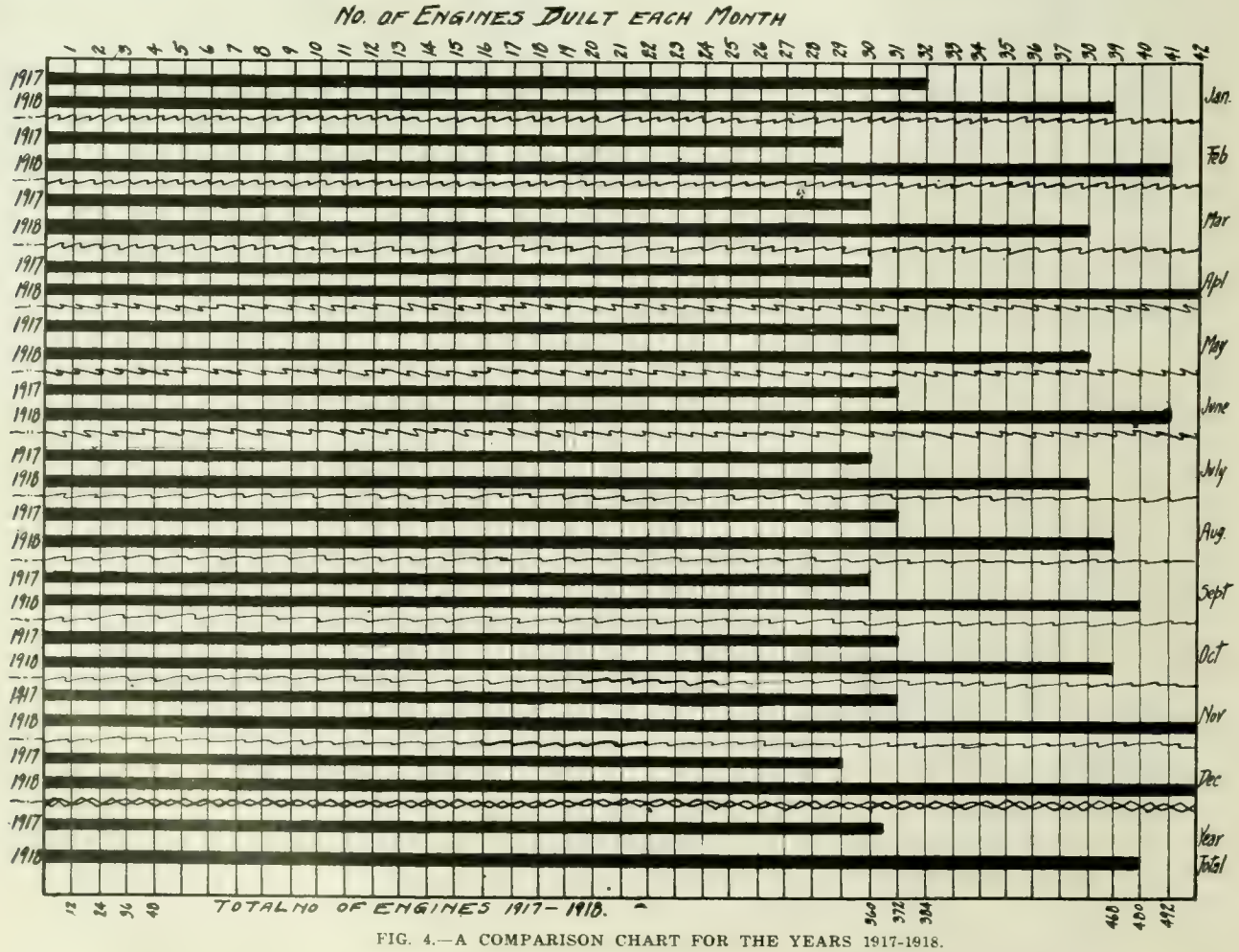


FIG. 4.—A COMPARISON CHART FOR THE YEARS 1917-1918.

The other operation charts also showed a variation in costs, but not so marked as the particular chart illustrated. Every chart on each operation was studied carefully, with the final result that this machine tool spoken of was manufactured at much less cost than formerly. Each department was placed under careful check, and production soared accordingly.

Another source of annoyance to this firm was the great amount of scrap or spoiled work. This item did not begin to show itself until the cost system got into operation. Fig. 2 shows the results in three departments.

As can be noticed the horizontal scale illustrates a half year's work or 26 weeks, while the vertical scale represents the value in dollars. The line A represents the drilling department, the line B the shaping and planing depts., and the line C the lathe department. The chart illustrates clearly that the lathe department was the chief offender as regards spoiled work, one particular week reaching a maximum of $8.50. Investigation proved that carelessness on the part of one particular workman was the whole trouble. Therefore the department itself was not to blame, but only an individual, which proves it never pays to come too hastily to conclusions, but rather it pays to investigate with an honest attempt at discovery, rather than an idea of calling some particular department over the coals. The other departments were likewise gone into, with the result that less spoiled material was turned out by this firm.

We will now go into another business altogether, namely, a firm engaged in the manufacture of gasoline engines. Things were not looking any too bright for this concern, as production seemed very erratic, and costs exceedingly high. A cost system was started and the first chart made was that of the production of engines week by week. Fig 3 illustrates this graph clearly. As can be noticed the vertical line represents the

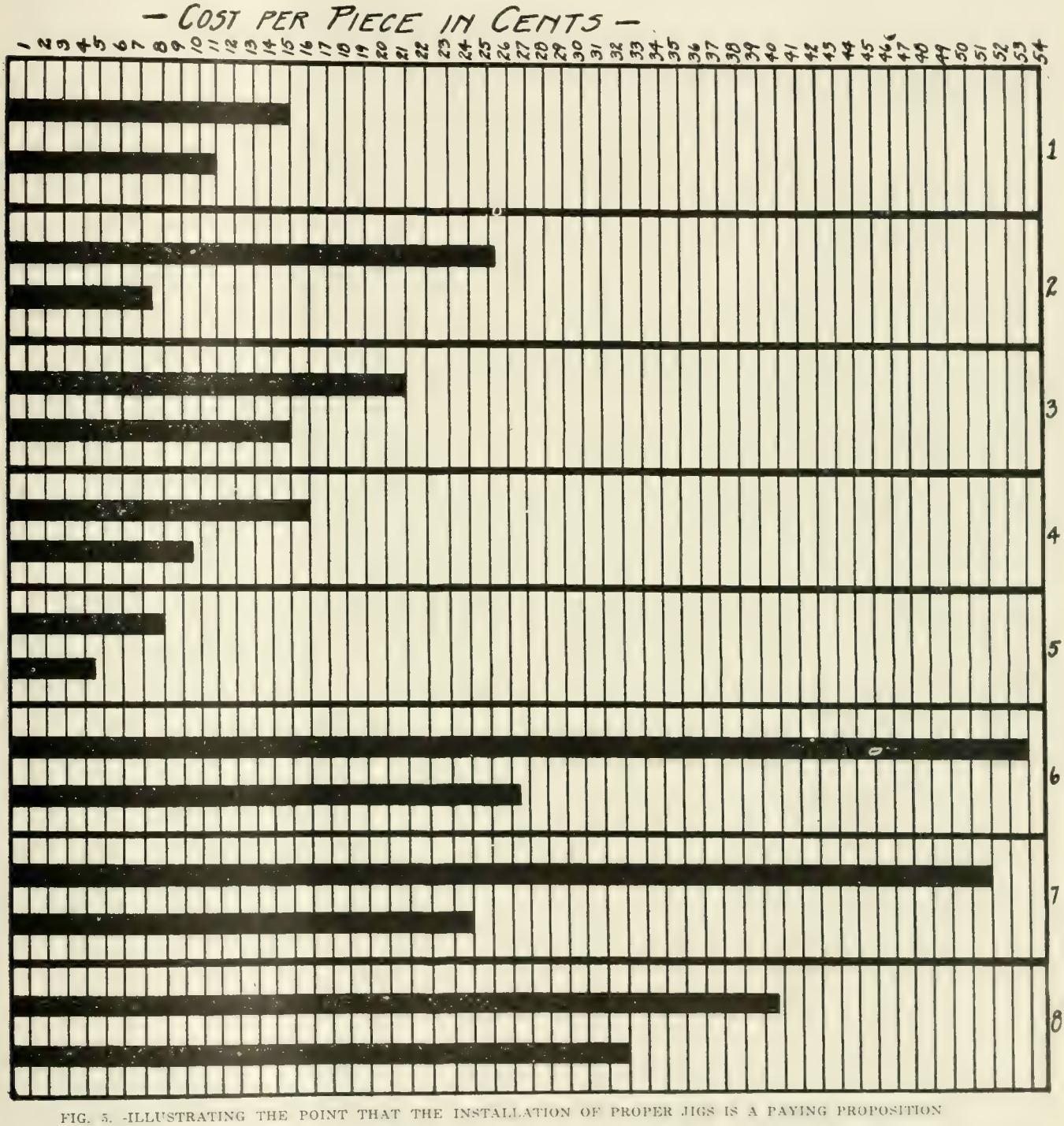


FIG. 5. -ILLUSTRATING THE POINT THAT THE INSTALLATION OF PROPER JIGS IS A PAYING PROPOSITION

number of engines completed, while the horizontal scale shows the weeks in the month. One of these charts was prepared for each month. In the particular month shown on chart there were two working days over the four weeks.

The line A designates the gradual step in production as follows: eight engines the first week, five the second week, making a total of thirteen and so on, up to a total production for the month of 35 engines.

The lower line B represents the fluctation of production, week by week. To illustrate that it is sometimes a very little matter which hinders production, let us comment still a little further on this chart.

From 5 engines to 11 engines, between the second and third weeks, seems quite a difference, yet this was easily explained after investigation. It was through no fault of the assemblers that this difference occurred, but rather that the work from the various departments was not coming in as it should be. The result was that each assembler naturally slackened up during the week that insufficient parts were coming through.

But look what happened when the parts came through faster. Assembling soared to eleven engines, proving that with a proper study of routing operations throughout the shop, production could increase all around. Later on this theory proved a fact, and before long 18 engines were being turned out each week.

At the completion of the year 1918 a chart was made to show the differences between the years 1917 and 1918 production, with the result shown at Fig. 4.

Instead of a total of 365 engines per year, 480 engines were completed in 1918, making an increase of 115 engines, which was not so bad for the first year's improvement.

Of course, various changes throughout the plant were helpful in bringing these results about, one of the most important of which was the installation of a good practical jig and fixture plan. Wherever thought advisable a jig was made for a piece, where, perhaps, before no such fixture existed, or if it did, it was some poorly constructed affair that hindered rather than helped.

After every jig was designed and put into actual operation, close tab was kept on the new operation cost. This in turn was compared with the former cost. From these two costs a chart was made to show the difference. The result is illustrated at Fig. 5.

Here we see that the horizontal chart designates the cost per piece in cents, while the vertical chart represents by 1, 2, 3, 4, etc., a separate jig for each section. Section 1 represents a drilling jig installed on the connecting rod. Where before this piece cost 15 cents, it was made for 11 cents after the jig was used.

Section 2 represents a milling jig on the same piece, and shows what an enormous difference can be made by a really efficient jig. From a cost of 25½ cents, this piece came down to 7½ cents. These figures were carefully checked and are absolutely correct.

This can be carried right down the line, but we will only take one more example, namely, section 6. This operation was the milling of a certain portion on the cylinder. From 53 cents, the cost was reduced to 26¼ cents, with only an expenditure of $12.00 for a new fixture. In other words, the fixture was more than paid for in the first day's run.

The writer could go on with such examples indefinitely, but he has shown what he believes positive proof, that a cost system, if intelligently handled, is an absolute necessity and a wonderful money saver. In no case shown has he quoted any elaborate schemes, but rather a common-sense method of going after the trouble. These charts will no doubt suggest others equally applicable, perhaps not to the same lines, but to the machine trade generally.

Disraeli had it right when he remarked that "Economy does not consist in the reckless reduction of estimates. On the contrary, such a course almost necessarily tends to increased expenditures. There can be no economy where there is no efficiency."

With these concluding remarks the author will close his article, merely suggesting that when looking around for a cost system, look around also for the correct man to handle it. The practical system, combined with the practical efficiency engineer, cannot help but prove a winner. One without the other is useless, but combined they make a valuable asset to any business.

SOME SPEED

Miss Margaret B. Owen, who now holds the world's championship for speed on the typewriter, certainly tickled the old keyboard, for she pounded out 137 words a minute for one hour. This means she had to hit the keys 12 times every second, which is faster than the ordinary person can dictate. It took seven years of determined struggle before she attained this record.

HATS OFF TO HORSEMINT

Are you aware that when you use your tooth paste you are indebted to a weed called horsemint? This weed grows wild in great abundance in Wisconsin, and is used in tooth wash, and tooth paste almost exclusively. The next time you feel that clean, refreshed feeling of the mouth, praise the wild weed, horsemint.

STARTING EARLY

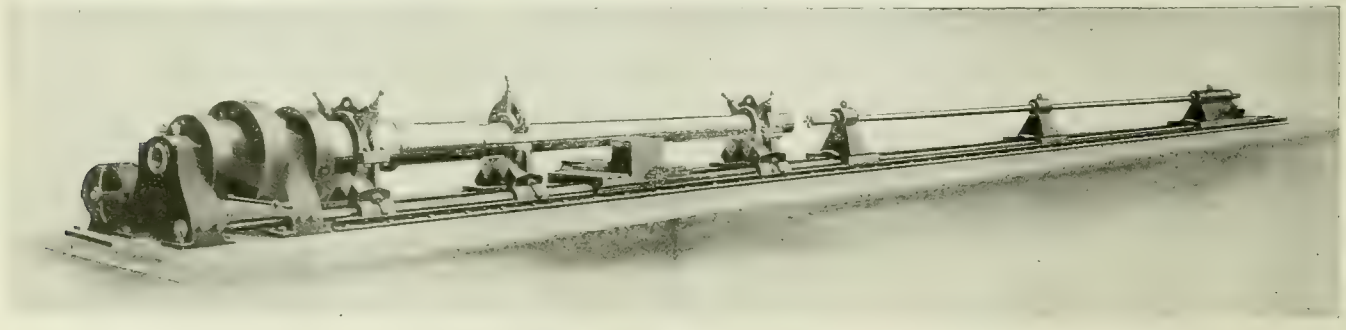
A Cincinnati high school lad, who is rather inclined to model building, has succeeded in building the following models: Submarine chasers, airplanes, and racing car. The car has only a wheelbase of six feet, and has a two-cylinder motor, yet is said to be able to travel at 70 miles per hour.

SOME DUEL

Out of Africa comes the thrilling story of how a lioness and a six cylinder car fought an exciting duel. The car and animal met head on, with the result that soon the lioness was no more. A dent in the car's radiator was the only damage to the car.

THE FIRST PAPER

What is believed to be the first daily paper published was called the "Daily Courant." England was its home, and it appeared in the form of a single sheet, printed on one side only. This paper appeared in the year 1702. Compare this with the paper of to-day, yet this occurred not much more than two centuries ago.—J.H.M.



NOTABLE GUN-BORING MACHINE ON CONCRETE BED.

They All Refer to the Labor Troubles Here

Industrial Leaders in Various Canadian Centres Say Strikes Are Causing Business Interests to Hold Back—Many United States Firms Are Coming to Canada Very Soon

WHEN the war ended last November business men looked with considerable uneasiness to the winter. A large part of the energies of our manufacturers had been diverted to the making of munitions, and in many cases manufacturers had given a heavy hostage to fortune by taking a chance on the war continuing for several years. It was with that expectation that the United States made their war plans.

Those who got into the game of munition making early in Canada were able to write off the heavy expenditure on plant and machinery which was, in large part, useless for peace purposes, and made a good deal of money. To those who began later, fortune was not so kind, and many actually suffered loss from the munition making business. For all there had to be a sudden reversion to peace production again, and even yet things have not begun to run smoothly in their old channels again. The expected trouble was not so severe last winter as was anticipated. The returned men were demobilized gradually, and the gratuity given them enabled them to tide over the winter. There is, as yet, no serious congestion of labor, although some people are looking with some anxiety to the coming six or eight months.

The labor disturbances throughout Canada have been a serious economic mistake. One of the most serious hindrance has been in the building trade. As Mr. Hobson, head of the Steel Company of Canada, pointed out to CANADIAN MACHINERY when interviewed at Hamilton a few days ago if labor does not get down to business soon there will be no building done this season, which will make things bad for next winter, whereas if the walls and rough work were finished now there would be inside work provided for next winter.

"Business conditions are improving steadily," said Mr. Hobson, "and a great deal depends on labor. The steel business is picking up in the United States, and that will likely be reflected here to some extent. Our largest blast furnaces have been under repair for some time and will be blown in again about the 20th of July. We got out of war work before the end came. Our war sales in November were only about 11½% of our output. We never refused to supply anything the Government wanted, but we did not seek war work.

"Everyone realized that it would take some time to get back to a peace basis, and I advised our shareholders of that as far back a 1916. When the war came there was really a much worse upset of conditions than there is now, and times were worse. Canada has a big task before her; but she has also more wealth than she ever dreamed she would have. Our employers took over two million dollars' worth of Victory Bonds. We should not have much trouble in coming back." Referring to the demands for wage increases, Mr. Hobson said: "There has been no demand made by our own men at all. It has been made by the agitators. Our doors are never closed to our workmen. Our men all went out at Swansea, but it was a sympathetic strike. They made no demand on us at all."

Getting Back to Old Shape

Mr. Pook, manager of the Canadian Westinghouse Company, said there was a very good feeling between employers and workmen in Hamilton. The manufacturers and labor people had got together. "We cannot always give them all they want, but in this plant if a man has any grievance I am always ready to talk it over with him. We have many old employees who have stayed by us, and I think they realize that they will get a square deal. At present we are working out a mutual benefit association which will provide cheap insurance.

"We are not completely over the period of readjustment in Canada since the war. It upset things considerably, as we had to have new standards; but we are getting back with satisfactory speed. After the armistice there was a slump in business, but it is coming back now. Even during the war-time rush we tried to keep up with our regular work. We made a great deal of machinery in the way of presses and work for ships, and tried to keep both ends going. The most of the shell machines were scrapped, although a few were rebuilt for rough work. In our case it was lack of business that kept us from getting back to stable conditions more quickly. We are not altogether through the readjustment period yet, but our people have been very reasonable, and we try to reciprocate. We have a 48-hour week here, working 8 6-10 hours for five days and 5 hours on Saturday. There does not seem to be much unemployment in our line. While we are not working full time, we expect that when the grain begins to move production will increase."

The Cause of Labor Unrest

Mr. John Muir, of Goold, Shapley, Muir, Brantford, has some very interesting views on the tariff and other questions, and has what would generally be called rather an unusual viewpoint for a manufacturer. Regarding labor and industrial conditions, he says there seems to be an abundance of labor but very little "labor trouble." Some months ago there was a good deal of agitation in Brantford, but it has quieted down. The manufacturers and the men have had frequent interviews and there was always a good spirit shown. "The unions are on to the Bolsheviki," said Mr. Muir, "and if they appeared here they would be chased out."

"The implement business is rather dull at present. There are bad reports from the West and we have not yet got settled down to proper export buiness conditions. One of the big causes of labor unrest has been that very high wages were made at munitions, and this demoralized conditions in other industries. We had good men here at $3.75 a day, and when we began to make munitions—for which work you could train any ordinary man in a week or so—they saw their fellow employees—green men—making six or seven dollars a day. This naturally caused dissatisfaction. The result was that we had to raise wages all around time after time. There were six munition plants in Brantford. When the munition work closed down there were a number of what might be called second-class men. When they were offered less pay than they had been making at munitions, some of them began to agitate.

"The attitude of the men with regard to agitation has been good, however. I'll tell you a story to illustrate it. Among the workmen we had was a Russian. When the war ended the men had a little dinner among themselves at which this man was present. When the toast to the King was proposed he refused to stand up, and he did the same thing when "God Save the King" was sung. The result was that the men refused to work with him any more, and he had to get out. Some months afterwards he was around distributing seditious and Bolsheviki literature, but he made no headway. I believe in giving labor credit every time, and their attitude here has been good.

"Conditions in the West are pretty bad. I came back

from there three weeks ago. The C.N.R. was tied up with the labor trouble, and our different branches could not ship. Where the drouth was bad, we had orders not to ship goods unless it rained. When I came back I naturally decided we should go slow in manufacturing, which means a reduction of hands.

"It is up to the manufacturers to make every possible effort to get foreign trade, otherwise we shall have a dull winter. That, in my mind, is the solution for the labor question in Canada to-day. We are doing our utmost in that line and have arranged with a big Montreal firm to handle our lines for the Balkan business."

Getting Export Business

Col. Harry Cockshutt, of the Cockshutt Plow Co., says the class of labor they receive is none too plentiful. Their plant is now closed down for inventory, etc., but the prospects for future business are fairly good, though the effect of the crop failure will likely be felt later on.

"As we have attended strictly to our own business and not made munitions," said Col. Cockshutt, "the transition from war to peace did not affect us very much. We kept our organization intact as far as possible during the war.

"With trade conditions uncertain and unrest among labor it is necessary for business men to go carefully in all their undertakings. We find export business fairly good. We are shipping largely to Europe and have had a satisfactory business all through the war. There was a big demand for tractors for their greater production campaign in Great Britain. In that business it is largely a question of giving the people what they want. Their style of implement is very different from the Canadian demand, particularly in plows and cultivating tools. The mouldboard of their plow, for example, is different from the Canadian. The Canadian tractors are very acceptable to them and ours received the highest award at Dublin Fair. Before the war, the tractor plow was practically unknown there, but now there will be a big demand for it.

"Our business is about one-third in Eastern Canada, one-third in the West, and one-third export. In regard to the latter, we have not asked the Government to do anything for us, but have acted on our own initiative. We anticipate a good export trade, and are shipping twenty-one cars to England alone in the next ten days. If Canadian manufacturers want to do an export business they must follow it up personally, as they can then get first-hand information which they cannot get in any other way."

The Damage Done by the Strike

That the strike of the metal workers in Toronto and some of the other industrial centres has set business back the best part of a year is an opinion that is freely expressed in trade and business circles.

"Two weeks before the strike came there was a noticeable improvement in the steel trade," stated Mr. F. C. Brunke, manager of the U. S. Steel Products business in Toronto. "Buying was commencing then on a more generous scale, and there was a return of confidence in the stability of prices that had been absent for a long time. It seems likely that the strike will be settled, and work begun again, but the trouble is that the mischief has been done. Structural work, for instance, is off for the season. As a general thing structurals are put up in the building season, leaving a great deal of interior finishing to be done in the winter. There will be none of that work this winter, as it will hardly be possible now to place business at the mills and get structurals erected for winter completion."

There have been many instances, according to Mr. Brunke, to show that unfavorable events have been plentiful enough to impede the return of normal conditions in the steel market. "Following the signing of the armistice," he remarked, "many of the consumers were in doubt as to what lines to turn to, and even yet there are cases where this same state of mind prevails. 'Waiting' seemed to characterize everything during the first two or three months of the year, and there were several bank officials who came out about then with decidedly pessimistic interviews, which did not tend to improve matters at all. Then toward the end of February the talk of price-cutting began to disturb the market, and every rumor that came out tended to make the buyer of steel think he was making a serious mistake in going into the market. The automobile, stamping, forging and agricultural industries were the first to show signs of recovery, but of course, many of them were covered on their wants by yearly contracts. The month of May also saw the eyes of Canada turned to some extent to Washington to see what would be the outcome of the squabble between the steel mills and the U.S. Director-General of Railroads, who refused to recognize the fixed prices. The impression seemed to gain ground that this move was going to let prices drop to a very noticeable extent. A little survey of the situation would have shown the impossibility of this, but it all helped to hold back the volume of business that should be expected from Canada. It was just at this juncture, after the Washington affair was settled, that there was an improvement. For instance, we were ready to close a deal for the supply of raw material to a firm that was going to make automobile rims in Toronto. It would have been a nice business for the city, but the strike came and the promoters of the business simply cancelled everything. What has happened since then is fresh in the minds of all who have followed the trade.

"Against this, there is an improvement in the buying. During the month of July we booked one order for 15,000 tons, the largest single order since the signing of the armistice. It is particularly unfortunate that Canada has had the amount of labor unrest that has occurred this year. The people of United States take a greater interest in this matter than most people suppose. They watch these events very closely. The Republic has not had anything like the trouble that has been found in the Dominion since the conclusion of the war."

Mr. Brunke, in conclusion, pointed out that the steel trade in United States was in splendid shape, and that in several lines the mills were practically out of the market, being filled to and beyond capacity for months to come. This is especially true of the pipe mills, and semi-finished branches. Prices are firm, in some lines with a higher tendency. It is his opinion that nothing whatever is to be gained by staying out of the market in expectation of lower values.

U.S. Firms Coming to Canada

The future of Canada, industrially, seems to look bright to the outsider, judging from the number who are looking across this way from the other side of the border. Mr. C. W. Kirkpatrick, Commissioner of Industries and Publicity for Hamilton, informs CANADIAN MACHINERY that there is a very pronounced increase in interest among our neighbors regarding Canada. There have been scores of inquiries, and there have been seven new industries from the United States located in Hamilton this year, including the following: Hoover Suction Sweeper Co., of North Canton, Ill.; Beaver Motor Truck Co., Chicago; Quaker City Chemical Co. (a branch of O. F. Zurn & Co., Philadelphia), oils, greases, finishing, etc; Gerard Wire Tie Co., New York (this company is incorporated for $400,000 in Canada); Lynat & Co., of Philadelphia, hat linings.

"The prospects for the future are extremely good," says Mr. Kirkpatrick. "We have at least one hundred United States concerns now negotiating for locations in Canada. They are feeling their way now, with a view to locating within the year. The unsettled condition of the labor market is keeping them back somewhat. Thev are also waiting to see what the preferential tariff will be. If it is high, there will be a great deal of manufacturing done in Canada for export. The Hoover Sweeper Company came to Canada for that reason. They expect

an increase in the British preference. They were not looking to the local market.

Freedom From Strikes

"One thing that has helped us this year in Hamilton has been the freedom from strikes. I attribute this largely to the fact that the men own their homes and are, therefore, more contented. There has been no Bolshevism and no strikes this spring of any account. The manufacturers and labor leaders here are entitled to a great deal of credit for the way they have handled things. After the war they got together and discussed the situation in an informal way, and the factories were readjusted to meet whatever conditions might arise. Foreigners were gradually weeded out and their places taken by returned men. The foreigners had been reaping a harvest. They drifted away. When one was dropped from one factory he was not taken on at another. The foreign population in Hamilton to-day is not more than half what it was a year ago.

"The outlook here is very, very good; and if labor conditions become settled I think 1920 will be one of Canada's big years. The prospects for the coming winter are not so bright, but I hope that new industries coming in will be sufficient to absorb the surplus labor on the market in the fall. By that time the soldiers will have exhausted their gratuity and will want to go to work; and outdoor labor also will be looking for winter work inside. Moreover, manufacturers do not feel like taking future orders, owing to the uncertainty of conditions. But when we get through the winter I think everything will be all right.

"We are getting a good many inquiries from Great Britain for locations, and the first big industry came this year—Porritts & Spencer, Bury, Eng., makers of commercial felts, which are chiefly used in paper making plants. They make blankets also. They think Canada will be the paper-making country of the world in the future, and that they will find a market here for their whole product. They will export to Japan from here. The plant is a million dollar one and employs 500 hands. There are many inquiries from Great Britain, both direct and through their chambers of commerce."

Mosquitoes two million years old.—Writing on the probable antiquity of mosquitoes, as shown by the geological record, Prof. T. D. A. Cockerell, of the University of Colorado, states that the oldest forms positively identified as belonging to the genus Culex or other genera of the mosquito family have been found in Eocene rocks, and are probably about two million years old. A form known as Culex damnatorum was described by Scudder from the Green River beds of Wyoming. Another Eocene species has lately been discovered by Mr. D. E. Winchester, of the U.S. Geological Survey, near Cathedral Bluff, in western Colorado, and is to be called Culex winchesteri.

Experimental air-sounding apparatus has been installed by the British Air Ministry on a 10,000-ton transatlantic cargo boat as another item in its after-war flying programme. The Ministry hopes to make the experiment a valuable preparation for transatlantic flying, and also a thorough test of the four appliances used: Winch, wire, kite, and meteorograph. Two winches are used, as a matter of fact, one at the ship's bow and one at the stern, thus allowing the kites to be flown from either end to avoid entanglement with the rigging. The mooring cable, which will rise five miles into the clouds, is of fine steel, very similar to marine sounding cable. The kites themselves are collapsible and made of fine linen and bamboo in two types, the larger measuring about 8 ft. by 6 ft. And finally, the meteorograph, the brains of the apparatus, consists of a revolving drum on which pen points register variations in humidity, pressure, and velocity of the air. When actually making soundings, this instrument will be towed four or five miles above sea level in the bigger box kite, while the small pilot kite will fly 400 ft. nearer the ship.

Valued for its weather-resisting qualities, galvanized iron or steel has long been produced by dipping sheets of the metal into molten zinc, which deposits itself as a coating of small crystals or spangles. Occasionally, however, sheets have been produced with large spangles which, it was found, improved both the appearance and the non-corrosive qualities of the product, and hence increased the price it would bring. So one plant has raised the value of its output by treating high-grade molten steel with an alloy containing titanium before rolling it into sheets and subjecting it to the zinc bath. It is claimed that 75 per cent. of the treated sheets emerge from the bath with the large spangles desired.

Out of the war shortage of tin has come a new and successful substitute for babbitt as a bearing metal. It is composed almost wholly of lead, hardened by an electrical process. Its high manufacturing cost is more than compensated for by the low market price of lead compared with tin. The new metal shows a tensile strength of 13,000 lb., the figure for genuine babbitt being 11,000; and an elastic limit of 11,525 lb. as against 10,000 for babbitt. Its friction factor is very low. With a shaft running at 400 r.p.m. and a load of 1,000 lb. per sq. in., 150° was the highest temperature reached by the bearing.

Across 11 miles of rough country near Pittsburgh, Pa., is being constructed what is probably the largest gas line in the world. It will have a maximum diameter of 40 in., enabling it to convey 70,000,000 cu. ft. of gas daily from a by-product coke plant to three steel mills.

Cassel in Chicago "Daily Journal."

The Fiddler Presents His Bill.

The Handling of Material in the Small Shop

The Solution to the Handling Problem is Often a Very Simple Matter if Thought Out Seriously—Here is One Example Where One Problem Was Very Easily Solved

THIS article does not pretend to cover the requirements of the large size, up-to-date plant, but rather applies to the small shop which cannot afford an elaborate crane system to handle their product from the shipping door or platform.

In a small shop, such as we wish to bring the readers' imagination, there is generally a monorail crane installed right down the centre of the shop. This crane is supposed to handle all work within the confines of the shop, irrespective of its position. This usually means that if the shop is rather wide, rollers are placed under the work, when the work is skidded over until it comes within reach of the crane.

They never seem to realize what an inconvenience this is nor the fact that good money is going to waste every time they adopt this near-sighted principle, and so they go on from day to day, merely making ends meet with only a fair profit.

To suggest an improvement is the start of a storm for you will, ten chances to one, hear them say that their shop is not large enough to warrant the expense of a better crane system.

They usually start to talk of the expense of an overhead crane, when often, even if they did desire to place such equipment in their shop they would find themselves without the necessary head room. Briefly they are stalling for wind and excuses and so they plug along under this load.

It never seems to enter their mind that even a monorail system can be installed to cover at little expense the entire floor area without the necessity of using the roller skids.

A little careful thought, together with suggestions from the crane manufacturer, will often bring surprising results in efficient handling, yet the penny-wise, pound-foolish policy continues to exist.

This policy seems to be especially noticeable when it comes to the shipping department in the small shop. Usually the complete department consists of a door instead of a platform, and no mechanical means of transporting ma-

A PROBLEM IN LIFTING AND SHIFTING WHICH IS TOO OFTEN NEGLECTED.

terial from the shop to wagon or vice-versa is supplied.

When the wagon is drawn up at the door this is the signal for three, four and sometimes six men to go out to the door and aid in the lift from the wagon to the door level. This distance is generally at least two feet, sometimes more, and as the material is often quite heavy the result is that the men return to their work in none too good condition, not to speak of the sore spot it always leaves in a man to think that, in a way, although he is employed as a tradesman, yet he is from time to time called upon to do the work of an ordinary laborer.

Another point not considered is the waste of good time. If the day is fine the men as a rule have a little chat, perhaps a smoke if the management is not too strict, and so the expense item mounts up. Year in, year out, this goes on, while if a system of some type was installed the wasted time alone would soon pay for the equipment.

A typical example is illustrated at Fig. 1. Here we see the old, old story. The small shop, with its side shipping door leading into the alleyway, the motor truck has drawn up with the box. That is usually the signal for the foreman to shout, 'Oh Jack, Bill, etc., etc., come and give us a lift, will you?"

But in this case the solution was different and sensible. This firm got tired of the lifting by hand stunt, so rigged up a Herbert Morris 1½ ton crane as shown at Fig. 2.

Of course the problem was solved so easily that no comment is necessary, in fact the solution was self-apparent from the very first. The only difficulty seems to be to convince the owner of the small shop that by installing such a scheme he will save money in the end.

So this article was prepared almost, we might say, as as illustrative moral lesson that it pays to handle your goods mechanically.

HERE IS THE SIMPLE SOLUTION THAT THE MORRIS CRANE CO. INSTALLED

The Government of India has appointed G. T. Barlow, chief engineer for irrigation of the United Provinces, and J. Mears, electrical adviser to the Indian Government, to inquire into the country's water-power potentialities. They will personally inspect water-power sites and decide which ones are worthy of detailed investigation. This will be the first step in a thorough hydrographic survey in preparation for the eventual development of India's power resources to their fullest extent. The supply of coal is limited, and in view of the great industrial expansion expected in the next few years the investigation of alternative sources of energy has become a question of national importance.

That flowers sleep is evident to the most casual observer. The beautiful daisy opens at sunrise and closes at sunset, whence its name "Day's eye." The morning glory opens with the day. The "four o'clock" awakes at four o'clock in the morning, but closes its eyes in the middle of the day, and the dandelion is in full bloom only while there is strong light.

The Leaside Shops of Canadian National Railway

CAR SHOPS AND TRANSFER TABLE

Forge, Locomotive and Car Shops With Capacity of Ten Engines and Ten Cars Per Month—Round House Also is Provided With Ten Stalls—Interesting Machines in Locomotive Shops

By T. H. FENNER, Associate Editor

TO the citizens of Toronto the name of Leaside has become familiar during the past strenuous years. Though its appearance and the natural features of its approaches are of a bucolic rather than industrial cast, it has been associated with industry of a most concentrated kind. The Leaside Munition Co., one of the most efficient plants under the direction of the Imperial Munition Board, were busy turning out enormous quantities of shells of various calibres for a long period. Close by was the aviation camp of the R.A.F., and from this camp many courageous and expert flying men went forth to battle with the Hun.

Now that these activities are happily no longer required, it might be thought that Leaside would be allowed to sink back to its pastoral calm, disturbed by nothing but the searcher after a lot to build his house on. This is not the case. Leaside having once been the home of national enterprises is perpetuating its good work. On its sandy soil has been reared a collection of workshops, owned by the people of Canada, to care for and rejuvenate the locomotives and cars of Canada's National Railway.

The site has many features to recommend it as a railway shop location. Within about three miles of the end of the Yonge Street car line of the Toronto Street Railway, about one and a half miles from the Metropolitan car lines, with good roads leading to it, and directly on the main line of the Canadian Pacific Railway, it is easily approached. It is near a large centre of population, from which to draw its labor, and also possesses the advantage of having space in which to expand as expansion becomes necessary. There is plenty of land available for home building, and there can be no doubt that the coming of the railway shops will mean the building up of a residential district in the not far distant future. As other industries are locating in the neighborhood, the housing development is altogether likely.

At the present time a portion of the working forces are being accommodated in temporary quarters, bunks and beds fitted up in the round house building. When the round house is put into operation it will be no place to woo Morpheus, the snore of the human being is of but tiny proportions compared to the grunt of a tired locomotive.

The General Layout

The photograph showing the exterior of the buildings gives a good idea of their arrangement and extent. On the extreme right, outside the round house, is a turntable connecting with the main line and with the ten tracks leading up to the round house stalls. Directly behind the round house is the power plant, where the electric power, compressed air, heat and light are generated.

The central building is the office and store space. The office building is a three story erection, large enough to house the full clerical and executive staff. The portion of the building devoted to the stores is directly behind the office. It is of two storeys, and is equipped with a shipping platform extending the full length of the building. The tracks are depressed sufficiently to bring the platform of the cars level with the platform of the store room, to facilitate loading and unloading.

To the left of the office building is the locomotive shop, wherein is contained all the varied machine tools necessary to the work to be done. One side of the shop is devoted entirely to the locomotive pits, of which there are ten. Directly behind the locomotive shop is the transfer table, which is used for placing locomotives and cars respectively in their desired position in the shops. The car shop is behind the transfer table, and our illustration shows this plainly.

The forge shop is situated in front of the locomotive shop and directly in line with it. Narrow gauge tracks are laid in the forge to provide easy handling of material and between and through all shops the standard rails are laid.

On the ground between the shops and the main line a large sorting yard is being laid out, about ten sets of tracks being now in position.

The Forge Department

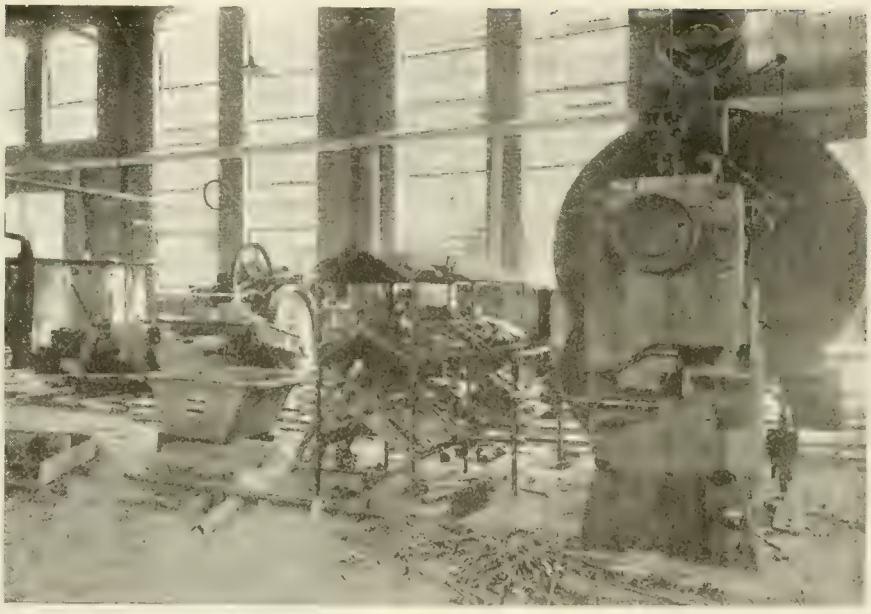
In a locomotive repair shop the forge department is the keystone. This is where the raw material, that will eventually become accurately machined and fitted parts of the great machine is re-

ROUND HOUSE, OFFICE, LOCO SHOP AND FORGE

ceived. Here it is heated in oil and coal furnaces, hammered and beaten by hand and steam power, crushed in a giant bulldozer, to finally emerge as connecting rods, side rods, brackets, bolts, springs, spring bands, etc. Some pieces, such as springs, are finished in the forge, while other parts are sent to the locomotive shops for machining and fitting.

To perform all these operations quite a number of tools are required, and skilled operators to work them. The shop at the time of writing was not quite complete, some machines not having been put up as yet. However, work was being carried on briskly, and the two views of the shop shown in our illustration give the reader a good conception of the arrangement.

Down one side of the shop are the coal fires and hand anvils. The centre is devoted to the hammers, and the other side to the power machines and oil furnaces. Entering the shop at the west end, one sees the tool smith busily engaged in fettling chisels and sets, etc., at a fire on the left. Occupying the centre is a 300 lb. Beaudry motor driven hammer. This hammer, capable of delivering blows rapidly, is a very useful tool for such jobs as small welds, making bolts, pins, and light work of all descriptions. To the right of this is a small oil furnace in connection with a centre punching machine. The work done here is to make a pop in the flat leaf springs, which serves the purpose of keeping them in alignment in the built-up spring. The tit on the one spring fitting into the pop on the succeeding one. Close by this is a 16 in x 12 in. spring bander, working with compressed air, its purpose being to press the heavy bands onto the springs which hold the laminations together. This machine is made by Joseph T. Ryerson, Chicago. Coming down the shop we next find an 8 in. x 1½ in. Bertram shearing machine, motor driven, which is plainly seen in the illustration. Against the wall, and not visible in the photograph, is a 2 in. Ajax bolt forging machine, with its accompanying oil furnace. The 8 in. bulldozer can be plainly seen in the illustration, the heavy spur wheel and connecting rod conveying a good idea of the power of this machine. Alongside of the bulldozer is an oil fired furance, for heating the work. On the occasion of the writer's visit the spring smith was using this furnace to temper and set the leaves of the laminated springs. The photograph taken from the other end of the shop shows the steam hammer, with the blacksmith's fires in the background. The large hammer in the foreground is a Niles-Bennet-Pond 3500 lb. hammer, while the smaller hammer in the centre is a Bertram 1500 lbs. The shop is lofty and well lighted, and there was a notable absence of the gas fumes that too often hang around a forge.



FORGE SHOP, SHOWING SHEARING MACHINE

This is really the foundation shop of a locomotive repair works, occupying the same relative place as the foundry would in a stove factory. As can be seen from the illustrations, ample space has been arranged around all the machines. The bench seen is, of course, only in use while the installation is being made.

FORGE SHOP, SHOWING LARGE HAMMER

The Locomotive Shop

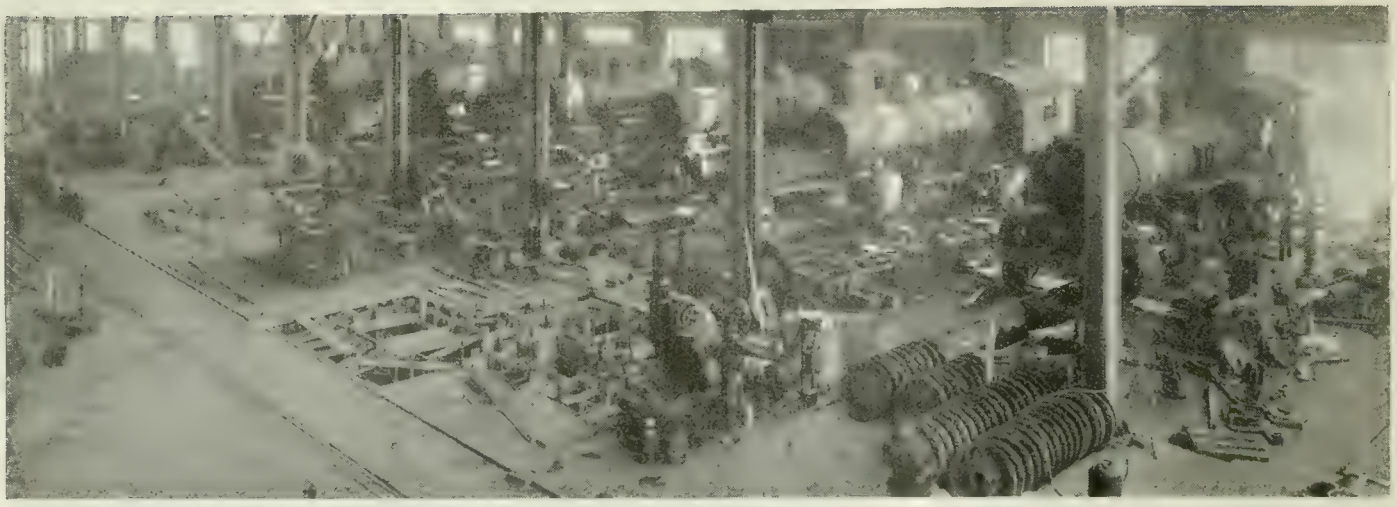
From the forge the logical step is to the locomotive shop, pausing on the way to observe the huge stock of tires piled outside. One also notices the plate rack, where the boiler plates are stored. This is situated at the end of the building, where the least amount for handling will deliver them into the boiler making section of the shop.

Entering the shop, the thing that dominates the eye is the array of locomotives in different stages of dismantlement, occupying the whole of one side of the shops. There is something almost pathetic in their helpless state, contrasting so strongly with the idea of enormous power that a railroad engine usually conveys. There they stand, supported on huge blocks, with their natural means of locomotion torn from under them, while skilful locomotive doctors tear out, to replace in new strength, their innermost vitals.

These locomotives are up for what is known in the language of the road as a "general." Its full description is general overhaul. After a general, a locomotive is good, with the exception of minor running repairs, for a working stretch of from two to five years. The length of time will, of course, vary with the exactions of the service in which it is engaged.

When a locomotive is brought up to the shop for a general overhaul, it is first put over the jackpit. This pit contains a 200 ton electric jack made by the Whiting foundry. The uprights shown in the illustration form supports and guides to the two heavy cross beams, which are raised and lowered by the revolution of the heavy square threaded screws shown.

The locomotive being placed over the pit, the jack is raised till the frame of the engine is supported by the cross beams. The main bearings are then



VIEW FROM GALLERY IN LOCOMOTIVE SHOP

slacked off and the jack is elevated until the body of the locomotive is clear of the trucks. Side rods, conecting rods, eccentric rods, are all disconnected from the driving axle before the lift is made, leaving everything clear for the trucks to be run out.

The body of the engine is now resting on the jack, and in order to free the pit for another locomotive to come in, wooden blocking and low, strong trucks are brought into use. These trucks are run in on the rails and strong blocking built up on them to the locomotive frame. Lowering the jack, the weight is taken on the blocking. The trucks, carrying the locomotive, are then run out on to the transfer table, shown in our illustration. This table performs the service of placing the engines on any one of the ten tracks available. The transfer table carries its burden up to the required track, and permanent blocking is built up from the ground, and the frame wedged up till the weight is off the trucks. These can then be removed and used again for the same purpose on other trucks.

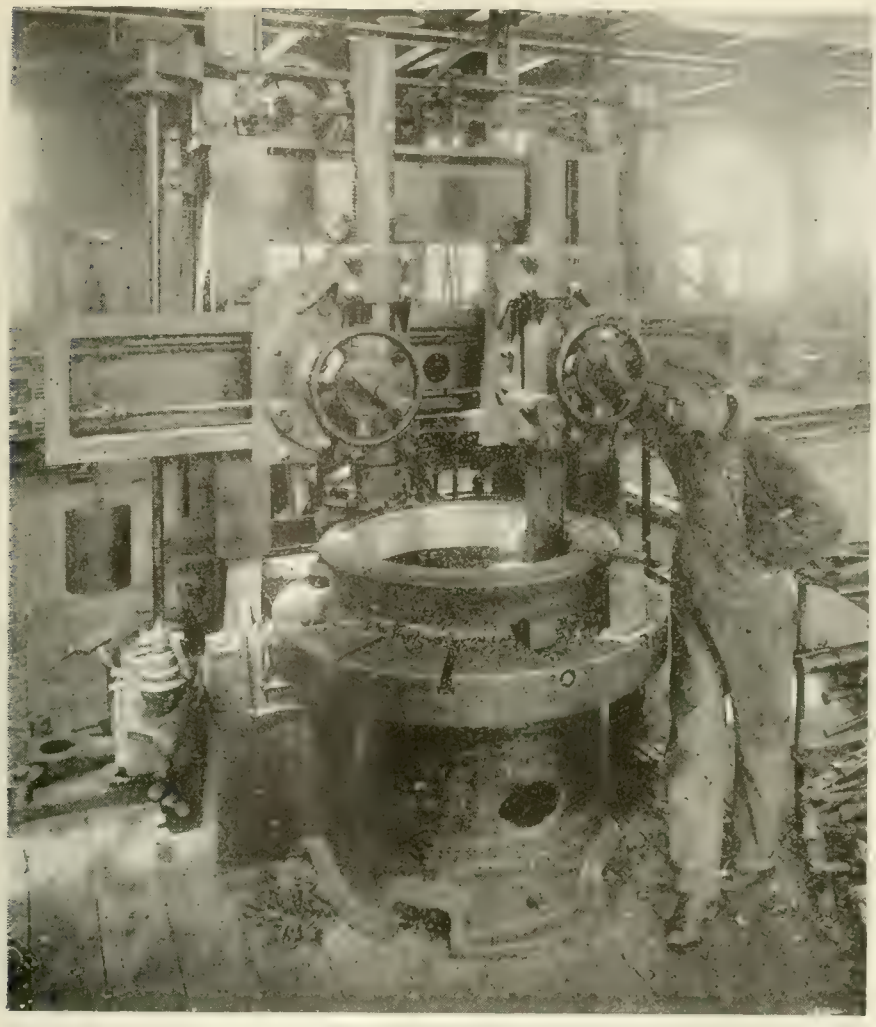
When set up on the permanent blocking work is commenced right away. The boiler will be examined thoroughly and all necessary repairs made. These will consist generally of new stay bolts in fire box, building up of any parts wasted by corrosion with the oxy-acetylene or electric process, removing the boiler tubes, and after cleaning, welding new ends on, if the condition justifies, or if not, putting new tubes in. While these are out the shell will be cleaned internally. The superheater will be gone over thoroughly, and in fact every part narrowly examined.

The engine will be taken apart in detail, cylinder covers removed, pistons drawn, piston withdrawn, in some cases the cylinders dismounted from the engine frame, guide plates, crossheads, side rods and eccentric straps and rods all taken down and examined carefully. Connecting rod and side rod ends will probably require new bushings, cylinders need boring out, new pins fitted here and there. In connection with the cylinder boring, the wirter noticed a very handy rig in the shape of a portable boring bar, driven by compressed air, and bolted on to the engine frame.

The air pump for the Westinghouse braking equipment is dismantled, and overhauled, and all the piping and brake gear likewise. A galley running the full length of one side of the locomotive shop has half of its space devoted to air brake repair and testing. This is, of course, one of the cardinal features of train equipment, and must always be kept up to the highest efficiency. Our illustration shows nine locomotives in process of a general overhaul, and on the second one the tubes can be seen being removed from the boiler.

All three welding processes are in use in the shops. A large motor, which had suffered the misfortune of having its supporting lugs broken off, was being repaired by the oxy-acetylene process. The thermit method is also very much in evidence, and our illustration shows a good example of this style of welding. A portable electric outfit supplied by the

BOILER DEPARTMENT—SHEAR AND PUNCH



BORING OUT TYRES

Lincoln Electric Co., was also seen in the shop.

The Boiler Department

One end of the locomotive shop is fitted to deal with the boiler repairs. There is a tube welding furnace, and welding hammer, where the tube ends are removed.

The rolls for bending boiler plate are here, and a large Canada Machinery Corporation combined punch and shears. This machine, with the men engaged in punching a plate, is plainly shown in our illustration. There is also a double-headed Landis threading machine, where stay bolts, studs, etc., are made. There is also a Jas. Crossen plate shear, Cleveland horizontal punch, and a John Bertram horizontal boring machine.

The Engine Department

Walking up the shop one comes to the motor driven wheel turning lathe, another Bertram tool. This machine is provided with two face plates and two tool holders. The wheels mounted in their axle are centred on the face plates and are turned up simultaneously for the tire to be fitted on.

Close by are located the fitting benches and lathes, where the link motion is fitted up. The link motion, of course, is the valve gear, such as rods, quadrants, valve blocks, pins. This is comparatively light work, mostly for straight lathe operations. There are two "Perfect" engine lathes and one Walcot. There is also a Walcot shaper, which was being used for shaping sides of connecting rod end brasses. Coming further up we come to the heavier tools. There is a Bullard vertical turret lathe, which is employed on piston valve liner work, a Canada Machine Corporation planer, which can be seen engaged on a cross-head guide plate, and a borer of the same make, boring out connecting rod brasses.

A good example of the heavier machine work is shown in our illustration of the Bertram double headed boring machine.

The shop is here divided by a track, for bringing in material from the forge. Crossing over this, we come to the connecting rod, side rod and piston department. The chuck and bottom brackets for main bearing boxes are planed and slotted here also. The machines here are representative. One notices a Bertram shaper, C.M.C. slotter, lathe by the same makers, and a battery of three quick acting drill presses by the Superior Machine Co., Kokomo, Ind.

An American Tool Works motor driven lathe is in use for turning the pistons, rods, axles and such heavy jobs. The large piston rings are bored and turned on a Bertram double headed vertical borer. Another Walcot shaper and engine lathe and a Perfect speed lathe are here. Heavy bolts are made on a Hartness flat turret lathe.

There is, of course, a tire pressing machine of the usual type, but we were not fortunate enough to see it in action. This machine is also a Bertram.

In our illustration showing the locomotives a foundation form can be seen in the foreground. This is for a coach wheel lathe, which will be supplied by Bertrams, who are also supplying an 84 in. boring mill. The Canada Machinery Corporation is furnishing a 48 in. planer.

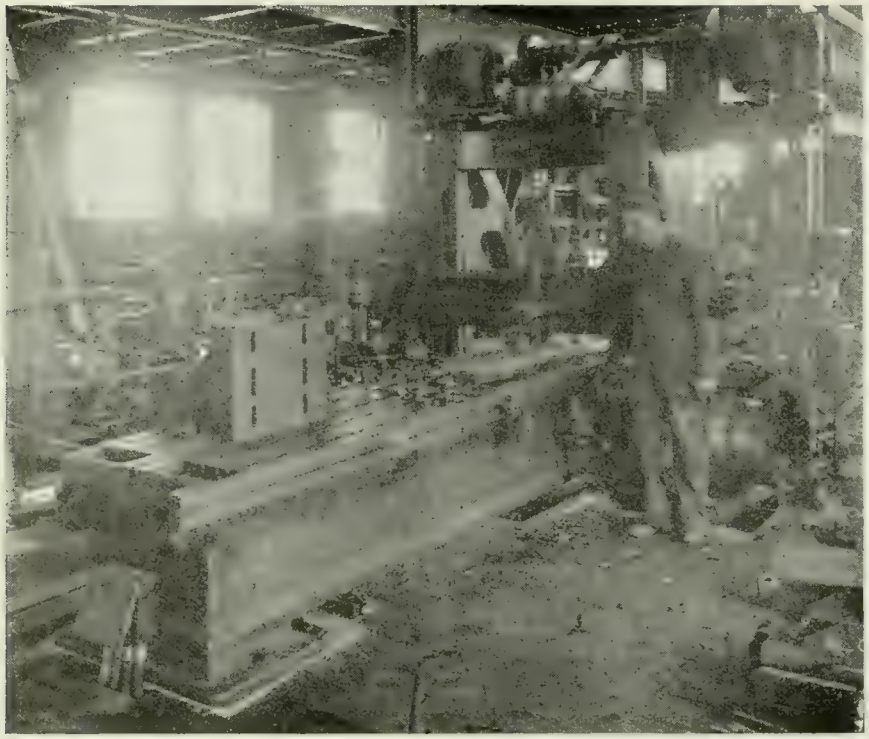
The locomotive shop is supplied by two Northern cranes, each of 15,000 lbs. capacity, and traversing the full length and width of the building.

The Car Shop

Leaving the locomotive shop regretfully, for there was much to interest the observer, and crossing over the transfer table, the car shop is reached. The tracks correspond with those of the locomotive shop, so that the transfer table is available for both departments.

One thing is noticeable immediately on entering the car shop. It is the excellent light available through the many windows and skylights. Light is, of

TURNING WHEEL RIMS



PLANING A GUIDE

course, a necessity here, where so much of the painting and decorating is done to the cars.

The cars that come to this haven are battered veterans. One with its vestibule all crushed in, reminds one of a broken nosed prize fighter. A second shows all one end badly burned up, probably due to an overheated cook stove, it being a dining car.

Most of the tracks in the shop are occupied, the cars on them undergoing repairs so extensive as to suggest in some cases rebuilding. The bodies are jacked up from the trucks and the trucks run out to have the wheels, frames, springs, etc., all examined and repaired. The body of the car is then gone over, all broken woodwork replaced or repaired, upholstery cleaned up, lavatory accommodation examined and renewed where necessary. Finally comes the painting and varnishing and then the car is ready to be put in service again.

A space is left at one end of the shop to accommodate the necessary woodworking machinery, which is similar to that in use in any establishment manufacturing cabinets, etc. All that is at present installed is a swing saw and rip saw. Ten cars a month can be received, overhauled and delivered when the shop is working at capacity.

The Power Plant

The power plant building is located at the rear of the round house, and is a one storey building with firing floor in the basement. The boiler room is situated at the end of the building, nearest to the main tracks, and on elevated track is provided leading to the concrete bunker. Cars of coal are run up this track, over the hatchway and dumped, thus saving any handling.

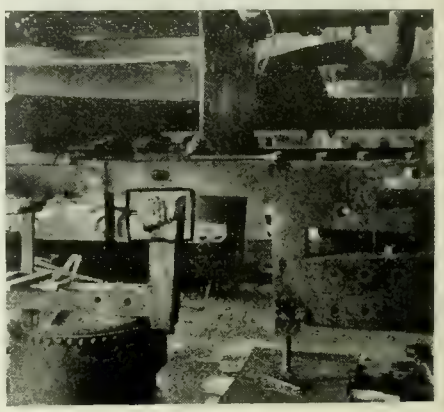
The boilers are of the Babcock & Wilcox type, four in number, installed in two batteries of 400 h.p. each. They are hand fired and fitted with Cyclone shaking and dumping grates. For returning condensation from the different buildings there in an installation of return steam traps, made by Geo. W. Cole Ltd. The pressure carried is 140 lbs. per sq. in.

The feed pump arrangements consist at present of three duplex outside packed Northey pumps, located in a pump room between boiler and engine room. Here is also the fire pump, which is of the usual underwriter approved type, made by the Canadian Allis Chalmers. It is 14 in. x 7 in. x 12 in., and has a capacity of 500 gallons per minute. There is also a condensing pump by Deane, Boston.

Ascending to the engine room level we find first the Ingersoll Rand unit, supplying the compressed air for the various shops. The capacity of this machine is 1,500 cubic feet of free air per minute, at a pressure of 100 lbs. per square inch. The cylinder dimensions are on the steam end, 14 inches by 24 inches, by 24 inch stroke. On the air side they are 22 inches by 13 inches, the stroke, of course, being the same. The speed of the machine is 170 r.p.m.

The electric generating units are two in number, and are alternating generators direct connected to vertical compound high speed engines. Both generators and engiens come from Old Country makers, the generators from Scotland and the engines from Lancashire.

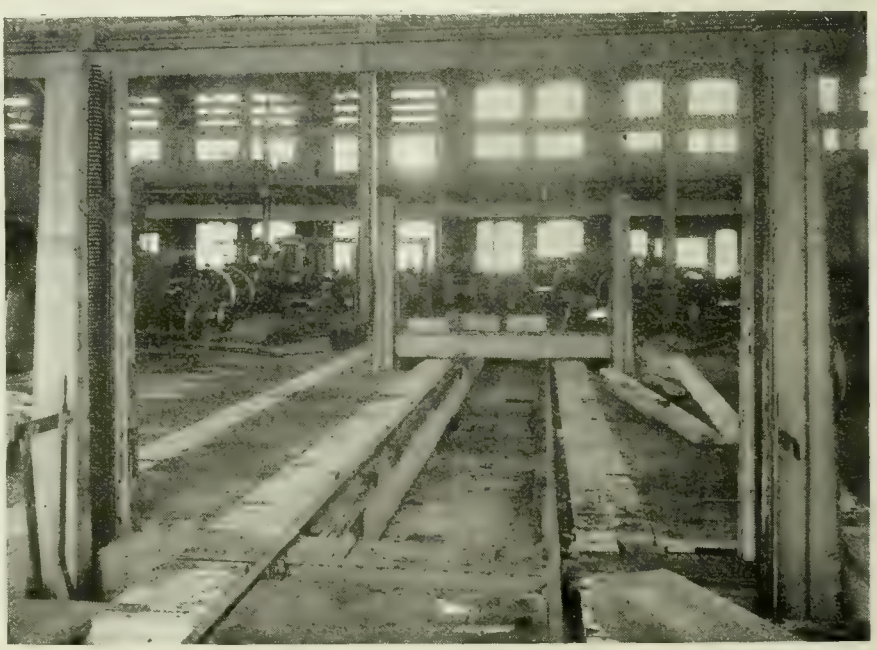
The generators are manufactured by Bruce Peebles & Co., Ltd., Edinburgh, and are of the 2 phase, 25 cycle type,



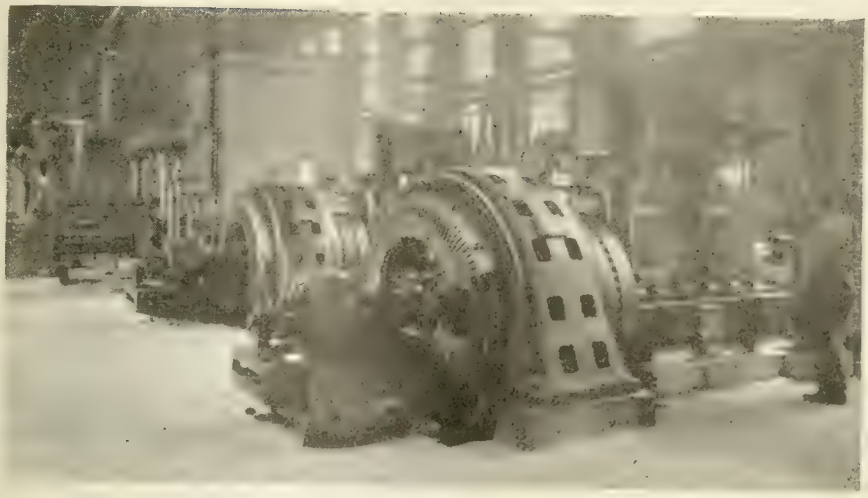
THERMIT WELD ON LOCO FRAME

generating 360 k.v.a. at 375 r.p.m. The electrical pressure is 560 volts. The exciter for the field coils is connected on the generator shaft, and works at 30 volts and 130 amps.

The engines are made by Brownet,



200-TON ELECTRIC JACK



DIRECT CONNECTED ALTERNATING GENERATOR

Lindley & Co., Patricroft, near Manchester. They are of the compound, vertical, high speed, enclosed type, working at 140 lbs. pressure, and with forced lubrication.

For supplying direct current to the variable speed motors, a C.G.E. motor generator is installed of 185 h.p.

Tunnels are being constructed between the power house and the different shops to lay the steam piping, water and air lines. These are being carried at present on temporary trestles overhead.

The Round House

The round house is not really round, being constructed on an arc of a circle. There is, of course, a large turntable opposite, which connects with the main lines and the radial tracks leading to the locomotive stalls.

The house is divided into two sections of five stalls each, the total accommodation being for ten locomotives. This round house is not in use as yet, being occupied, as mentioned above, as a temporary hotel and store room.

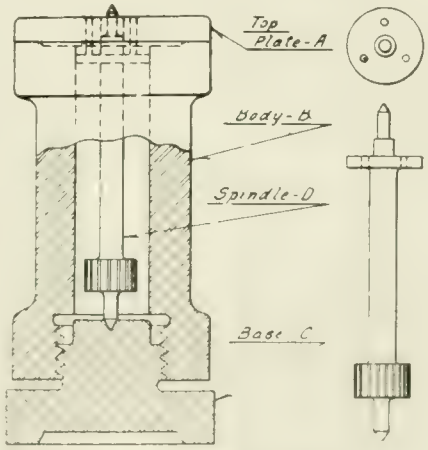
The shops as a whole will employ when complete and in full working trim about 700 men. A permanent industry of this kind must be of immense benefit to the district in which it is situated.

Later when the freight sorting yard is also in operation, Leaside will be an important point on the National Railway system, and will no doubt, engage in friendly rivalry with the Moncton shops for efficiency in their daily operation.

DRILL JIG FOR SPINDLE

The writer had a number of small gearing spindles to drill on the flange as per sketch. The spindles were part of a clock movement used in connection with electrical switchgear. The particulars of the jig are as follows:

A is the top plate made of cast steel, hardened and held in position on the body B with cheese, headed screws and dowel pins, the holes being too close together to allow separate bushes and thus dispense with the necessity of a top plate. The body B is of mild steel, screwed out at the bottom to take the base C and bored out to allow the spindle to drop into position for drilling. The base C is of mild steel, screwed to fit in the body B. As will be seen from the sketch, the base C has a hollow centre which locates the work and keeps it in position whilst being drilled. The screw on the base C is a coarse pitch and short, so that when the work is in the jig and the base screwed up, it just requires a couple of turns to lock it securely. I had intended making the



SECTIONAL VIEW OF THE JIG.

base and body in one piece and employing the same means of locking the spindle, as is used on the breech blocks of artillery, but abandoned it on account of the cost. The jig, as shown, proved very successful.

A certain American plan, which employs a considerable number of girls, were confronted with the problem that their female help complained that the men rushed and crushed them when making for the street cars in the evenings. The following notice was placed in a prominent position with splendid results: "Girl workers, comig in late, say they could not catch cars at the crosstown lines, because men from the plant rush the cars, and a woman might be badly hurt. Let's remember, fellows, that these girls are fellow-workers; some of them have to help support the family. Give them a chance and help them on the cars. It won't hold you back any, and it will be 'helping the other fellow' where it counts."

Since the beginning of the present year unemployment in Denmark has increased at such a rapid rate that it has come to overshadow all other problems. From a pre-war maximum of 50,000, the number of unemployed has increased until it now totals more than 63,000. The Government has been trying to meet the situation by the passage of laws for subsidizing labor union benefit funds, for establishing Government employment bureaus, and for lending money to communities in order to enable them to carry on public works. The Ministry of the Interior has called conferences between representatives of the trades unions and the employers' associations in the hope of reaching a solution of the problem.

A NEW USE FOR TRACTORS

Small tractors are proving of great value to the United States Government in drawing ashore their various seaplanes after their flights. This is a much handier method than wading in for them and pulling ashore, as was sometimes done. The field of usefulness for tractors of small build is practically limitless.

Peonage in Ecuador has recently been abolished by legislative decree. Prior to the passage of the decree, a peon was compelled to remain on an estate as long as he was indebted to the owner, a condition amounting virtually to slavery, since the owner could easily manage to keep the peon in a state of permanent indebtedness. The decree completed the emancipation of the peons by cancelling all their debts. A peon may now go where he pleases, work for whom he will, and enjoy equal rights with other citizens of the republic.

It isn't often that elephants are so numerous that they become a nuisance, but such is the case in a place called Addo Bush, near Port Elizabeth. The pesky animals will persist in spoiling all the farmers' efforts, and once in a while even get real wild and kill some people. The upshot is that the Government have decided to shoot them. This process, they figure, will take at least six months, and necessitate the erection of lofty observation towers. The younger elephants will be captured, if possible, and trained to haul logs in the forests, but the adults will simply be shot, and their meat consumed by the natives.

Getting Ready for the Shop Emergency

Every Well-Appointed Plant Must Have the Means to Deal Quickly and Efficiently With Any Mishap That May Be Encountered—How the Outfits Are Made Up

A FEW years ago when accidents occurred in the shop or factory intelligent first aid treatment was not possible. Training in first aid was lacking and equipment necessary for bandaging, treatment of wounds and burns and recovery from shock was in the majority of industries non-existent. Compensation costs, humanitarian motives and a growing appreciation of the necessity for avoiding loss to the individual and to the community have wrought an appreciable change, and today first aid, together with its more important corallary, accident prevention, is a very live topic.

Industrial accidents naturally vary in severity and in type with each industry considered, but, broadly speaking, may be classified as wounds and bruises, burns, poisoning and infection, electrical shock and those due to organic troubles particular to the patient himself. First aid appliances and remedies, then, should be ample enough and general enough in their nature to take care of practically all these features.

First Aid Cabinets or Boxes

For emergency work in the factory itself and where the factory is not of sufficient size to warrant a first aid room or hospital, cabinets or boxes are of much value and these should contain everything likely to be needed.

Bandages are an important essential, and several sizes should be included. Possibly the most used sizes are 2½ in., 1 in. and triangular bandages, and at least six of each kind should be on hand. The three-inch size is also frequently used.

Gauze and absorbent cotton are also very necessary, medicated gauze being especially useful. Several packages of each should also be kept on hand together with a spool of adhesive tape. The two-inch width is plenty wide enough and can be easily cut into smaller widths as required.

While at first sight safety pins may be considered an unusual part of first aid equipment, yet nothing is handier for fixing and fastening bandages in place.

Antiseptics should be carefully chosen for their efficacy and non-poisonous properties. Corrosive sublimate or bichloride of mercury should not be included, both on account of its poisonous properties and also of the frequency with which it may be purloined. Tincture of iodine, perhaps, is as useful as any, and hydrogen peroxide also comes in handy, while boracic acid makes one of the best antiseptics. Medical supply houses make a specialty of antiseptics for first aid work, and a number of excellent preparations are on the market, such as Triseptol, for washing wounds, etc., and Borofax, a borated ointment. One caution should here be observed. Never purchase ointments, etc., in jars, but always in collapsible tin tubes. The open jar may prove to be a dangerous source of infection, whereas in the tin tubes no infection from previous users need be feared.

Stimulants may be included to advantage and of these sal volatile, or smelling salts, and aromatic spirits of ammonia should always be on hand. Aromatic spirits of ammonia is especially valuable in case of faintness, and as a stimulant in case of shock from wounds, etc., if given with water. Ginger tablets are also of use.

Foreign bodies in the eye, when not deeply embedded, are most easily removed by means of oil, the oil being dropped into the eye under each lid and allowed to work itself out. Castor oil is excellent for this purpose and with it an eye-dropper and a package of camel's-hair brushes should be included.

With the above in a first aid kit should be included a pair of surgical scissors, a tourniquet for stopping the flow of blood, a first aid book, surgical needles and silk, and a pair of dressing forceps, a medicine glass and eye cup will complete the outfit.

The above list is quite complete and should be sufficient for the ordinary first aid kit. Space may some-

THE MASSEY-HARRIS CO. HAVE A WELL APPOINTED EMERGENCY STATION WELL FITTED UP.

times be saved by the use of compressed bandages and gauze, but while these may be used, compressed absorbent cotton has the very decided danger of possible infection from the operator's hands while being pulled out.

No mention has been made of remedies or first aid treatment for burns in the above. This, in some measure, is apart by itself as the likelihood of severe burns is not met with in all branches of industry. Where burns are likely to be encountered, carron oil or picric acid solution should always be on hand. Carron oil, an emulsion of limewater in linseed oil, forms an excellent and soothing first aid treatment, and at least a pint should be kept on hand with every first aid kit where burns are feared.

A precaution should be observed in its use. When a portion of the oil is used it is better to throw away the remainder and to replace it with a fresh sealed supply. This overcomes possible deterioration and infection of the old oil.

First aid outfits are usually put up by those making a specialty of their sale, in wall cabinets or tin boxes. The tin box for factory use is quite satisfactory and for small outfits a tin lunch box painted a good conspicuous red with a white cross stencilled on it is as satisfactory as any.

First Aid Rooms

While in the smaller factories and in the various departments of larger ones, the first aid kit meets many immediate needs, many companies are equipping first aid rooms for the employees where all treatment is given. And while in Ontario the Workman's Compensation Act requires service of this character in plants employing sufficient help, it is usually found that the equipment goes beyond the letter of the law, and is a credit in most cases to the factory where installed.

FIRST AID ROOM OF THE NORTON CO., CHIPPEWA. NOTE THE SCALES AND CHART FOR TESTING VISION.

The first essential is the choice of a well-lighted, airy room of sufficient size, centrally located and accessible. The walls should be painted in a light color, preferably a cream or white enamel, and made as attractive as possible. The floor, where much dirt and sand is liable to be tracked in, should be of battleship linoleum; hardwood marring and losing its finish too easily. Ample ventilation should be provided and windows and doors screened.

Equipment

Running water should be provided, hot and cold if possible. Some first aid rooms in addition to the usual wash basin of good size, are provided with a foot bath. A case in point is the first aid room of the Massey-Harris Co., Toronto, factory as will be seen from one of the illustrations.

An operating table should be provided. This need not have all the fixtures nor flexibility of those found in the operating rooms of hospitals, but should be strong and preferably made all of metal enamelled white.

A hospital cot covered with rubber sheeting over the bed clothes sometimes does service as a dressing table and is often found in addition to it. An instrument table is required. These tables are usually made up of a steel framework enamelled white and with plate glass or porcelain top and shelves. Their usefulness is seen in the illustration showing the Massey-Harris first aid room where bandages in glass jars, antiseptics and dressing basins are seen. Small instruments needed for ordinary accidents most likely to be met with are also kept on the table along with a tray of antiseptic solution.

Other fittings seen in this same room are a two-basin stand and an instrument and storage cabinet. It will be noticed that a small desk is also installed. This in itself is one of the most important features of the room, indicating, as it does, the necessity for careful records of every case no matter how small. Since records are necessary for the proper conducting of a first aid department, and since reports have to be made out to the Workman's Compensation Board, these two functions are combined and the clerical work minimized. In some factories and industries the report made out for office use and statistical reports differs only from the form required by the Board in being made out for all cases instead of only those coming under the Compensation Act. At the Massey-Harris plant Miss Cooper, first aid nurse, keeps a complete record of every case no matter how trivial the accident. This record is of material benefit where continued treatment is necessary.

In the treatment of burns medical practice, as developed by the war, has undergone great changes. The ambrine treatment devised by surgeons in France has worked wonders with cases heretofore considered hopeless. Burns which in the ordinary course of events would have resulted in hideous injuries are now healed up without a trace of scarring.

The treatment is simplicity itself. A mixture of parafine waxes mixed so as to secure a proper melting point in the original treatment were brushed on the injured surface and layers of gauze interspersed between applications. A recent development in this treatment does away with the use of a brush and the melted wax sprayed on by an atomizer which is particularly suited to the first aid station. Two types of these atomizers are in use, one a small one heated on an electric hot plate or other heater, and a larger size with a water jacket which insures even heating and keeps the wax hot longer. The J. F. Hartz Co., Toronto, handle a special burn dressing for use with these or other atomizers which was developed by Dr. Barthede Sandfort, a French military surgeon

This compound becomes fluid at about 120° F., and is applied to the tissues at a temperature of about 140° F. to 150° F. When applied this dressing causes no incon-

venience but on the contrary relieves the acute pain caused by the burn.

The chief advantages of this treatment are in the ease in which the dressing may be removed without pain and without the tearing of newly-formed cells. Skin grafting is usually unnecessary.

In building up the dressing the wax is first applied, then a layer of gauze, more wax, gauze, absorbent cotton

EMERGENCY STATIONS APART FROM THE WORKS ARE ATTRACTIVE. THIS ILLUSTRATION SHOWS ONE BUILT BY THE TENNESSEE COAL, IRON AND RAILROAD CO. AT ENSLEY, ALA.

and gauze, thus building up a dressing which is mechanically strong.

Equipment and supplies for a first aid station will, of course, include all that has been mentioned for the small shop kits or cases only in a more complete fashion and in greater quantities. Other items which are usually found are hot water bottles, scissors, tweezers, artery forceps, etc. A more varied supply of drugs is found including laxatives, salines, such as citrate of magnesia and sodium phosphate. Mouth washes, nasal sprays, A. B. S. & C. tablets, etc. Stretchers are important and it is often a wise plan to have a number located at convenient points in the shop.

Accident Prevention

Accident prevention has largely outgrown the "Safety First" movement in which it largely had its origin and to-day the display of danger signs is only one phase of the work. While these in themselves are excellent and necessary, it is better still to eliminate as much as possible the occasion for their use. The elimination of hazards and the intelligent education of the employee in the exercise of care both for his own sake and for the sake of others is recognized as being of far more value.

Two heads are better than one and the most effective means of securing the interest of the employees and also the elimination of positive sources of accidents is to put it up to the employees themselves.

Companies having to do with the generation and distribution of electrical power are keenly alive to the necessity for accident prevention and first aid work, not that accidents are more frequent, but that they are more frequently severe and affect persons other than those causing them. A number of excellent organizations have been started for the prevention of accidents by these companies and one which is applicable to general manufacturing is herewith described.

In the first place about 75% of all accidents are due to the man himself, not, perhaps, entirely to his carelessness but to his deficient interest in their prevention. Five per cent. are due to the deficient guarding of machinery, live parts of electrical apparatus, etc. This also includes the accidents due to the removal of guards while working on a machine and their not being returned. Twenty per cent. of the accidents occurring are due to purely accidental causes over which no control or very little can be exercised. These proportions are those obtained by only one company, but may be taken as indicative of industry in general. The most striking lesson to be drawn from these figures is the large percentage of accidents due to the personal factor or the man himself. To effectively diminish the toll taken by industrial accidents it is, then, necessary to interest the man himself at the same time as provision is made for the elimination of the mechanical features of a plant tending to cause accidents.

The system worked out by this firm may be of some interest, and in its working out valuable features worthy of note are evident.

Organization was placed directly in charge of an outside engineer who made it a specialty. In addition to the preliminary work of organizing he has been retained to act in an advisory capacity, and is in attendance at every meeting of the various committees formed. Seven sub-committees were formed, each one representing a particular department or group of departments when they were of small size. The members of each committee were appointed to serve about six months by the head of the department who was also a member, permanent, and who acted as secretary. The chairman of all the sub-committees formed a central committee with more authority, and to whom questions of a responsible nature were referred. An executive committee, consisting of the higher members of the executive staff of the organization, was also formed. The members of the various sub-committees were chosen in such a manner that each represented between 10 and 15 employees. A general secretary and supervisor who served on all committees was very necessary to the co-ordination of the work and to its smooth operation.

The various sub-committees meet once a month and have authority to pass on all matters of safe practice which do not involve the expenditure of money. Suggestions are encouraged from members of the various departments and these are taken up by their sub-committee approved of, rejected or, if of sufficient importance, referred to the central committee.

The central committee is competent to obtain results by the expenditure of money in maintenance work. Recommendations involving expenditure chargeable to capital account, or questions involving radical changes in design or policy are referred to the executive committee or council for their approval.

Recommendations are encouraged from everybody and

LUNCH BUCKETS CAN BE WELL ADAPTED TO EMERGENCY KIT PURPOSES.

each suggestion received is numbered. The number consists of first the number of the sub-committee in which it originated, followed by a dash and then by a serial number which only applies to these suggestions from the sub-committee in question, thus 7—27. Persons originating suggestions which have been put into practice or

have been approved are thanked by a personal letter from the management of the company.

Meetings of the various committees are held once a month in the company's time. Business arising out of the previous meeting is dealt with first and then any suggestions for the elimination of hazards, bettering working conditions, etc., are dealt with, and either acted upon, held up for investigation, or are passed on to the next higher committee where it comes within their jurisdiction.

Every accident is discussed by the proper committee and if possible its cause ascertained. Where possible a remedy is suggested which will eliminate similar accidents in future. The remedy, however, may have to do with more care on the part of the employee, in which case the recommendation is worded to that effect and has the effect of making others more careful.

All accidents, no matter how trivial, are reported and a form similar to that required by the Workman's Compensation Act is used.

The central committee receives a report from all subcommittees and is thus kept fully informed of the activities of all departments. One very important feature of the work is seen in the way accountability is determined. An accident may be due to faulty design, and the injured person entirely free from carelessness. Where such is the case the department responsible for the poor design is held accountable, not necessarily the one in which the injured man worked.

The above arrangement is developed into a monthly accident bulletin arranged somewhat as follows.

Section or Department.	No. of accidents in %		Days Lost in %	
	This year.	Last year.	This year.	Last year.
1	10	10	5	10
2	15	15	10	5
3	10	10	10	15
4	15	15	30	15
5	25	15	20	10
6	10	25	10	20
7	15	10	10	10
	100%	100%	100%	100%

The figures used are illustrative only and do not represent actual results.

It may be mentioned that in this present case only two accidents occur in each month in which a day or more time is lost, out of a total staff of about five hundred.

It may be argued that many of the suggestions would be impractical and perhaps even foolish. This is far from

THIS ILLUSTRATION SHOWS AN EXTREMELY WELL-EQUIPPED EMERGENCY STATION INSTALLED BY THE FEDERAL SHIPBUILDING CO. AT KEARNEY, N.J.

the truth, for out of all suggestions received, 72 per cent. have been adopted in their entirety and only about five per cent. absolutely turned down. This is a remarkable showing and well attests to the soundness of the scheme.

STEEL FURNITURE ENAMELLED WHITE HAS AN ATTRACTIVE APPEARANCE, AS WELL AS BEING SANITARY. THIS EMERGENCY STATION IS EQUIPPED BY THE AMERICAN STEEL AND WIRE CO.

Many of the suggestions have involved considerable expenditure and the number of things brought to light is truly surprising.

Plans for a tunnel under the English Channel, discussed so frequently during the last sixty-odd years, are now on the verge of materialization. It is announced that England and France are in perfect accord on the subject, and that war experiences have robbed its opponents of most of their contentions. From an engineering standpoint no serious difficulty is anticipated; through the impervious gray chalk underlying the channel bottom, electric drills will doubtless find easy and rapid passage. The plan calls for two 20-ft. tubes, side by side, connected at short intervals by cross openings. A drainage tunnel underneath disposes of seepage water. At the centre of its length the tunnel dips to its lowest grade for one mile, constituting a water lock which could be flooded from the shore in case of military necessity. The total length from near Dover to a point between Calais and Boulogne will be 30 miles, of which 22 will be 95 to 175 ft. below sea bottom. The channel's greatest depth over the proposed course is 180 ft. Estimates allow five years for completion, at a cost of $100,000,000. Electric trains will make the passage in 40 or 45 minutes, giving England direct access by rail to all parts of Europe.

A curious method of casting iron pipe, devised by a Brazilian engineer, has proven quite successful and is being commercially undertaken in this country and Canada. A rotary, water-cooled cylindrical mold receives the molten metal, no sand being used. The iron, at very high temperature, is poured through a funnel into a trough, which is immediately introduced into the revolving mold and turned over. Centrifugal force distributes the metal evenly, and as graduated ladles are used, there is no waste. The finished pipe is withdrawn a few seconds after the iron is poured, coming out lengthwise quite easily. The walls of pipe so cast are remarkably thin and uniform, and tests indicate greater strength and closer texture than result from ordinary casting in sand. Many experiments in centrifugal casting of iron pipe have previously been tried, but did not prove commercially practical. The success of this system is attributed to the cold mold and the instant withdrawal of the pipe, which hardens as soon as poured.

Shellac is often used on gaskets to make them adhere to the metal surface while assembling. Gaskets thus treated are rendered hard and brittle, and must be replaced when the parts are reassembled. Cup grease, smeared on the gasket, will serve the same purpose, and will keep the gasket soft and pliable.

Shop Transportation

HANDLING of Material Coming to Be Recognized as One of the Chief Factors in Efficient Shop Operation.

By J. H. MOORE,
Associate Editor, Canadian Machinery.

IN entering a subject of this nature, one cannot proceed with examples of shop transportation without just making it thoroughly clear what is meant by the term transportation. The meaning conveyed by this term is not confined to the moving of goods over considerable distances, but can be equally applied to the ordinary movements of shop routine.

It is a rather common occurrence to hear some executive remark that their plant is not large enough to warrant an investment in any form of shop haulage, but if they only realized it, the very fact that they are so prejudiced in their viewpoint may be the reason that their shop remains so small.

It may be a long stretch of imagination from shop haulage to automobile, yet for a moment let us consider the similarity. In the automobile field one can choose from the lowly and much abused flivver up to the various master sixes and eights in practically every style to suit the purse. The same condition exists in the transportation field to-day, for, depending on the size of your plant, there is a haulage system to suit your requirements.

It would be the height of folly for a small manufacturer to install an elaborate crane, trucking or conveyor system, but still that does not say he should remain out of the field entirely.

Let him weigh the matter carefully, study his own conditions with an unbiased mind, look around him and see what the other fellow has done, and then adopt whatever suits him best personally, in this way profiting by the experience of others.

But we hear him remark, "How can I best proceed to study this problem?"

The Total Cost of Production

Naturally the first question that arises in connection with a subject of this nature is how the total cost of production is affected by the methods employed in moving material within the plant, outside the plant, and, if necessary, to the freight termianl.

Ascertain how much time is consumed on actual manufacture, then investigate what time is taken up in handling. This applies to both the productive and non-productive forces. For instance a man at a machine might consume five seconds obtaining a piece of work, 2 seconds for the actual operation, and 6 seconds to dispose of the work. This shows that eight-tenths or 80 per cent. of this employee's time is consumed in handling.

From these observations it would naturally appear that in attacking this case in point, the handling time would be the big problem to overcome. Such an illustration as the above may seem exaggerated, but in actual experience it is often found that as high as 90 per cent. is lost by a careless system of handling.

IT IS OFTEN GOOD POLICY TO RUN THE FREIGHT CARS DIRECTLY INTO THE SHOP. THIS ILLUSTRATES THE PLANT OF WATEROUS ENGINE WORKS CO. AT BRANTFORD, CANADA, AND SHOWS THEIR METHOD OF MEETING THIS CONDITION.

To give a concrete example we quote the following case:

This particular operator, by the old system of handling, turned out 336 units of work each day, but by improving the handling detail alone, the operator turned out 584 pieces without any additional exertion in labor, proving that sometimes it is a very small matter which hinders production.

Another case showed that the cost of handling a particular product through a certain department was .59 per thousand pounds. By facilitating the handling of the productive operators alone, the cost was reduced to .12 per thousand pounds. From these two examples it is plain to be seen that the productive operator and his time of handling must be considered as well as the actual haulage cost.

What Equipment Shall I Use?

Once you have traced the leak, so to speak, in your methods, the next step is to select from the various items of handling equipment obtainable the particular type that is best adapted to your individual conditions and which will produce the best results at the same time eliminating the greatest amount of time and expense. This ought to be an easy matter, for any concern manufacturing such labor and time savers, are only too pleased, not only to send their descriptive matter upon request, but will even place their staff of expert transportation engineers at your disposal.

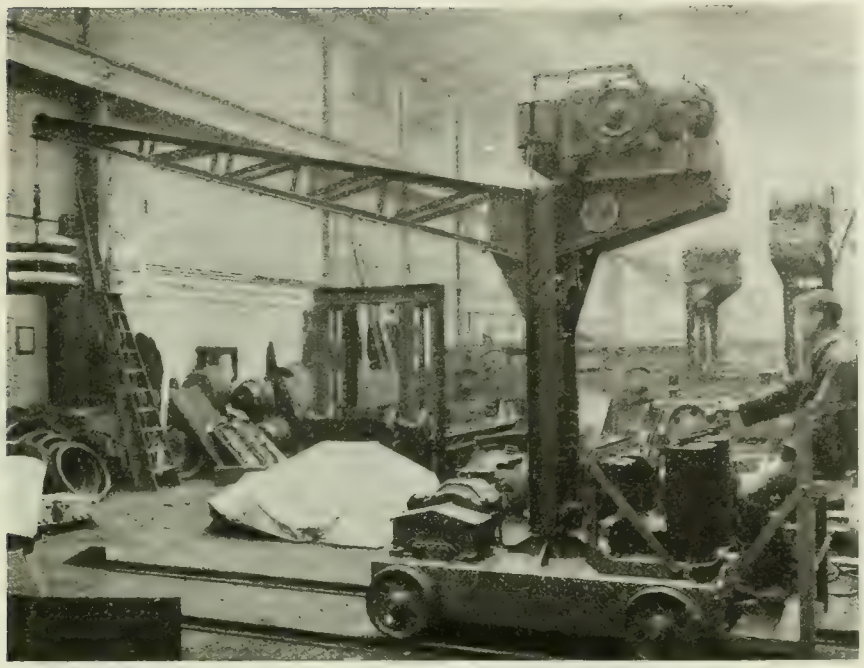
At this point, however, it is best to weigh all the various conditions carefully. Suppose, for instance, you find that new equipment of this nature will cost you possibly 30 to 40 per cent. of your estimated savings, and will reduce your handling cost 30 per cent. This looks splendid, but let us go still deeper into the subject.

We will suppose you consider other equipment, which will cost you 60 to 70 per cent. of the estimated savings, but which will save you 100 per cent. handling cost. Which is the better proposition? Of course, the latter installation in this case, which brings the matter up to a definite point, namely that a thorough investigation into the varous details surrounding your own particular problem is absolutely essential.

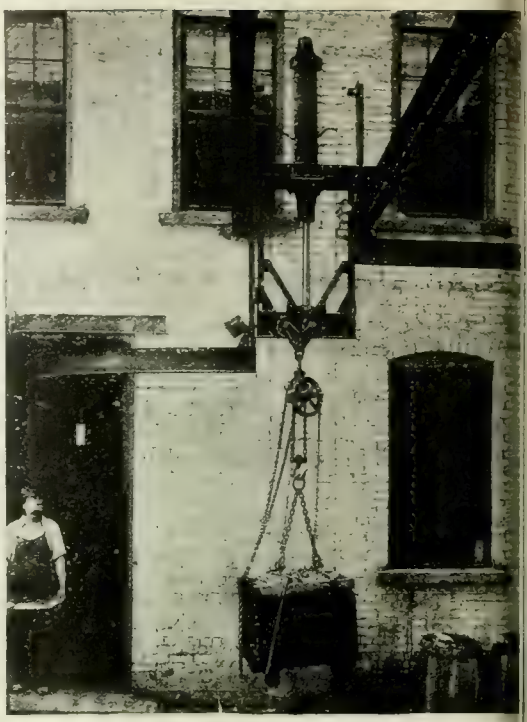
We know of one case where the actual saving in the handling question amounted to $750,000.00 per year in the plant of one corporation, while in several plants over $100,000.00 was saved every year by tackling this transportation bugbear. The wrong solution in any of these plants would have proved a serious affair, but the matter was attacked seriously and sensibly with the result that the installations were a perfect success.

We hear, in fancy, some one exclaim, "But these cases quoted are exceptionally large concerns." True, but everyone does not turn over such a large quantity of business as these concerns spoken of. This fact, however, does not deter you from saving in like proportion to your annual production, which brings us to the point once more

BY CONSTRUCTING YOUR BUILDING IN THE MANNER SHOWN YOUR CRANE DOES DOUBLE DUTY OF INSIDE AND OUTSIDE WORK. HERE WE SEE AN INSTALLATION OF A HERBERT MORRIS CRANE, 10-TON, TYPE G, MODEL. HERE IS A CASE WHERE FORETHOUGHT COUNTED.



THIS JIB CRANE IS ELECTRICALLY OPERATED AND SUITABLE UP TO LOADS OF 600 LBS. CRANES OF THIS NATURE WERE USED EXTENSIVELY IN ENGLAND DURING WAR TIME FOR SPEEDING UP PRODUCTION. THE CRANE RUNS ON NARROW GAUGE TRACKS OF 3 FT. 6 INCH. CENTRES.



HERE IS A VERY INTERESTING INSTALLATION OF SINGLE I BEAM TRACK SECTION LIFT, AS INSTALL BY THE CURTIS PNEUMATC CO. OF ST. LOUIS, U THE ADVANTAGES OF A SCHEME SUCH AS SHO ARE SELF-APPARENT, AS IT CAN BE USED IN MA DIFFERENT WAYS IN MOVING MATERIAL THROU OUT THE PLANT.

HERE IS A SPLENDID ELECTRIC CRANE INSTALLATION, FOLLOWED UP BY A WELL-KEPT STORAGE YARD. THE CRANE IS A NORTHERN CRANE.

of remarking, "Study your own particular problem, study it carefully, then act accordingly."

There are so many different kinds of movement time savers on the market to-day that to intelligently discuss the problem we had best consider a few of these one at a time.

The Crane

Perhaps the most widely used of all shop equipment is that of the crane, hand, electric and pneumatic. A plant to be up-to-date must have some system of crane installation to convey their work to and fro throughout the shop. In some cases the hand crane is found sufficient, but in other cases, especially where it would be difficult to reach with either an electric or hand crane, the pneumatic hoist, or air hoist as it is generally termed, becomes the favorite. From these observations we gather exactly the same conclusion as before, namely that your own particular condition is the problem to be considered.

To state definitely the actual saving by the use of cranes would indeed be an arduous task, but of one thing we feel sure, that without them, we would be in a sorry state. The saving differs with conditions, depending not only on the location, but the amount of thought which has been spent in their installation. A crane can be rendered practically valueless by poor judgment in installing. When considering such a problem, one cannot do better than first decide on the make and style of crane desired, then take the matter up with the firm manufacturing the product, who will be only too pleased to give the benefit of their former experiences together with suggestions.

There is another form of transportation which is used practically throughout the world, namely that of trucking. This can be either accomplished by hand or power, but in order to follow up our principle of discussing each system separately, let us consider:

The Hand-Operated Truck

These trucks have many uses, so many in fact that it is well nigh impossible to state them all in an article of this nature. Throughout shops of all kinds, in warehouses and at freight terminals you will see hundreds, yes thousands of these trucks in operation. In some cases they are used singly, while in other cases they are hooked up together as trailers, and pulled by means of the electric locomotive, which we will discuss later. But for this section let us quote an example of saving in hand truck handling.

In one plant recently investigated, which used over 30,000 four wheeled trucks, the estimated savings were approximately $750,000 per year, or 100 per cent. yearly returns on their investment.

The first question to decide in consulting a system of four wheeled trucks, to give moveable floor area, is the best designed truck to properly accommodate your product in its various forms. It is a foolish move to attempt to adopt some standard shape of truck if your product takes on different form to any great extent as it proceeds in its manufacture. If you do attempt to follow some standard your trucks will be only partially efficient. Ask yourself these questions:

UNFORTUNATELY SUCH AN IDEAL SYSTEM AS THIS DOES NOT EXIST IN THE AVERAGE MACHINE SHOP. IT IS USUALLY THE HABIT TO GET THE GANG TO HELP YOU LIFT THE WORK ONTO THE LATHE. THIS MORRIS TRIPE-GEAR CHAIN-BLOCK ELIMINATES THE TROUBLE, AND THE AUTOMATIC BRAKE ON SAME KEEPS THE PIECE SUSPENDED AT THE RIGHT HEIGHT TO SUIT THE OPERATOR. HERE IS A SCHEME WELL WORTH COPYING.

THESE FOUR-WHEELED TRUCKS ARE USED IN KNITTED GOODS TRUCKING TO GOOD ADVANTAGE. THIS TYPE OF TRUCK IS HANDLED BY THE EQUIPMENT MFG. CO., CLEVELAND, OHIO.

Should the trucks have ordinary flat platforms?

Should end racks be used?

Should your truck be totally enclosed or should there only be two or three sides to it?

Should the superstructure be solid or slatted?

Should shelves be provided, or should little compartments be made?

From these leads you can readily see the object of the cross-examination with yourself and shop conditions, for by spending a little time in this manner, you will increase to a great extent the efficiency of the truck.

The size of the truck is an important point, for that determines the quantity of product handled at each movement. Watch your clearances, also your heights. Another point which is not often considered is the question of floor surface. One cannot expect a truck or trucks to operate to best advantage if the floor surface on which they operate is not up to proper standard. Decide on the number of trucks you require to quickly handle your product for it is a penny wise and a pound foolish policy to cut down on the number of trucks and decrease their efficiency and cause congestion.

Since ball bearings have come into common use, the trucking problem has been greatly improved, for even with a heavy load on these trucks the design is so arranged that practically no effort is necessary to propel this type of vehicle.

The Electric Truck

The electric storage battery truck is too well known to need any introduction, for practically in every up-to-date plant one can see numbers of these very handy time savers in operation. There are two general types of these trucks for industrial uses. There is first the carrier truck, which takes its load from place to place, then there is the tractor type, which pulls loaded trucks, to whatever department is desired.

The principle of design is practically the same in both cases, electric motor supplied with current from storage batteries doing the driving. Generally the speed of these trucks is so controlled that they cannot travel at more than a predetermined rate. Steering is done by one hand, while the other is on the driving lever. If the driver moves his hand from the driving lever it immediately returns to neutral and the brakes are applied. But as we are not concerned so much in the design of these trucks as we are in their aid in reducing handling cost, let us consider a few examples of cost reducing.

Results That Count

A certain agricultural implement manufacturer installed electric trucks with the following results: Six tractor trucks are now being used to convey raw material from one department to another, where formerly this work was done by 30 men. These new tractors draw an average load ranging from 4,000 to 8,000 pounds over floors of brick, wood blocks and steel plates. Some of the grades

AN ELECTRIC STORAGE BATTERY TRUCK HANDLING MATERIAL IN THE FORGE SHOP. THIS TYPE OF TRUCK IS HANDLED BY THE ELECTRIC STORAGE BATTERY CO. OF PHILADELPHIA.

are as steep as 17 degrees, and range from 25 to 100 feet in length. The speed of these trucks is approximately 4 miles per hour.

In an automobile factory the trucking gang was reduced by 64 men by the installation of eight trucks of various types, varying with the class of work to be done. The average load was not over 1,000 pounds, and the floor areas were good. The finished parts are now handled with less breakage and damage, also there is no congestion

HERE WE SEE A SELF-LOADING ELECTRIC TRUCK MADE BY THE ELWELL-PARKER CO. OF CLEVELAND, OHIO. THIS TRUCK IS OPERATED BY TWO MOTORS, ONE FOR PROPULSION, THE OTHER TO DRIVE THE ELEVATOR. ITS USES AND ADVANTAGES ARE SELF-APPARENT.

A HAULING SYSTEM SUCH AS SHOWN CANNOT HELP BUT REDUCE YOUR COSTS. THIS IS A JEFFERY STORAGE BATTERY LOCOMOTIVE IN USE AT THE OIL WELL SUPPLY CO., OIL CITY, PA. IT TRANSFERS ALL KINDS OF MATERIAL AROUND THEIR PLANT WITH SURPRISING SPEED.

of material as formerly. A saving of considerable amount was also experienced.

In a certain rubber company 16 trucks freed 160 men for other work. This tire company spoken of uses these trucks for handling all hauling in the plant from department to department. The loads run as high as 3,200 pounds, the length of haul varying from 600 to 1,200 feet. High speed is the rule in this plant, the trucks running from 8 to 12 miles per hour. There are no grades, and the floors are wood and concrete. Unnecessary to state a large saving was the result.

Examples such as these could be quoted indefinitely, but enough has been given to prove the point that in every case it pays to move your goods mechanically and systematically. There is no hard and fast rule as to whether a carrier truck or tractor truck is best. This matter rests entirely with your own particular plant and conditions. For short hauls where the routes are short and irregular, and where the driver can easily handle the loads, the carrier truck is the most common. For hauls following regular routes and where there is sufficient work to keep trucks going all the time, with loading and unloading gangs, the tractor seems best adapted to reduce to the greatest extent the trausportation cost.

It is estimated that for a 10-hour day, $1.20 will cover interest, depreciation and upkeep. Of course, this may run higher or lower, depending on conditions.

Much of the operation costs depends on the work being done and the time the truck is actually at work, that is moving material, and the time lost waiting for a load or to be unloaded as the case may be. Without fail watch this latter condition, for here is a great danger point for a leak in the general efficiency.

For heavier work, and run, on the same principle, we have the industrial locomotive. These run on regular small gauge tracks, and the saving which these locomotives accomplish is enormous. Storage batteries, as before, provide the driving power. This, of course, eliminates the fire risk and overcomes the smoke nuisance. Throughout this article are shown various installations of the type of transportation with actual figures of savings.

The Gravity System

There is another transportation system in wide use, namely that of moving material by gravity. It will perhaps be best to quote what one well known firm has to say regarding the system spoken of.

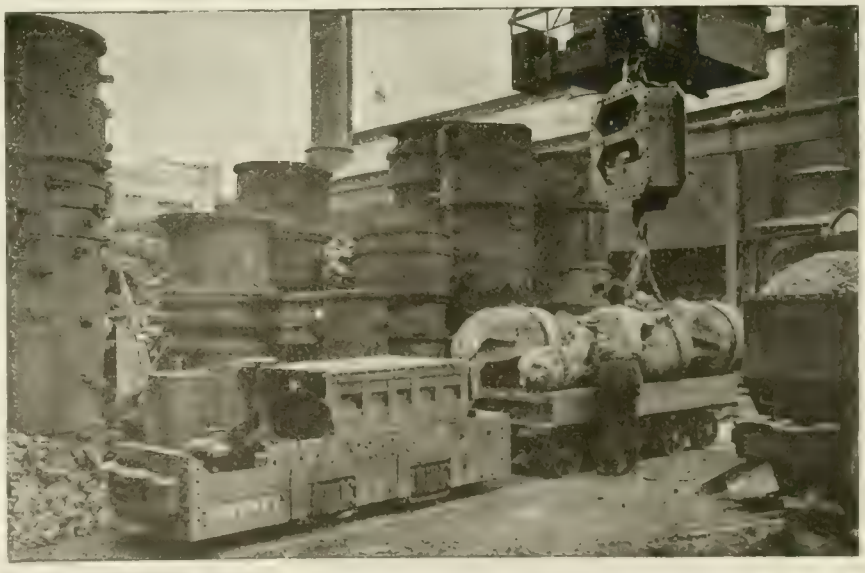
The gravity conveyor is the industrial roller coaster for carrying all kinds of products in every business. It operates for practically nothing, as it uses the free power of gravity, which is on the job 24 hours per day, and 365 days in the year.

To mention what products such gravity systems will convey would be impossible, for boxes, barrels, rolls of paper, brick, tile, lumber, and, in fact all products having at least one flat surface can be carried directly by this means. In the machine shop for instance small parts are placed in tool boxes, while in other plants rolls of cloth, or any products of irregular shape are used, the work is carried on trays, containers or pallets.

Of course to have an efficient system one must see to it that a system is installed where all rollers run freely on ball bearings. Should economy of space be important the conveyor can be suspended from the ceiling out of the way of machinery and workmen.

Another very strong point in favor of this transportation scheme is the fact that you can use portable sections almost anywhere. This comes in exceedingly handy when unloading cars, or piling cases in storage. These portions can also be provided with hinged sections, which can swing out of the way like a drawbridge when desired.

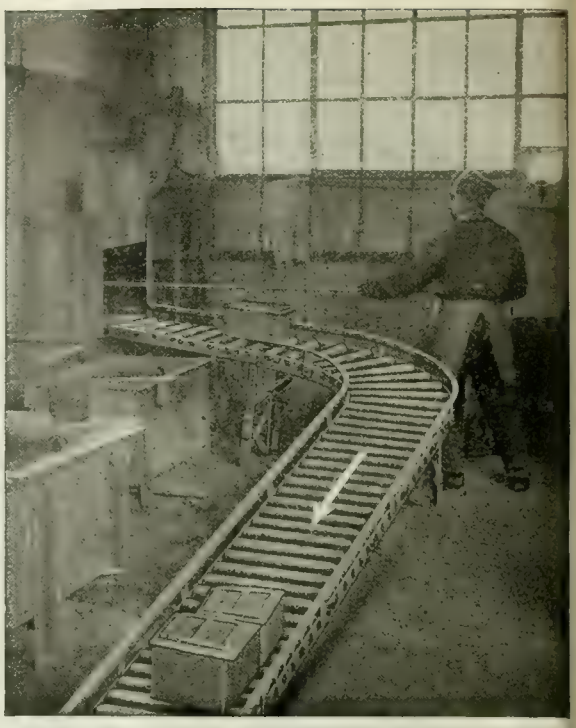
Curves hold no terrors for the gravity system, for the



THIS IS A CASE WHERE THE ONE MEANS OF TRANSPORTATION HELPS THE OTHER. HERE WE HAVE AN OVERHEAD CRANE WORKING IN CONJUNCTION WITH A JEFFERY INDUSTIAL LOCOMOTIVE. THESE ARE BOTH LABOR-SAVING DEVICES THAT NO LARGE INDUSTRIAL PLANT CAN AFFORD TO BE WITHOUT.

construction of a nice, sweeping curve by the roller system is a very easy matter. A big feature in favor of installing such a method is the small space taken up by the runways. These can easily be run between machines,

NO ACCUMULATION OF STOCK BETWEEN THESE MACHINES. LAMSON CONVEYORS CARRY TOTE BOXES OF MATERIAL FROM EVERY MACHINE DIRECT TO THE NEXT OPERATION. ONE CANNOT HELP BUT SAVE WITH SUCH A SYSTEM.

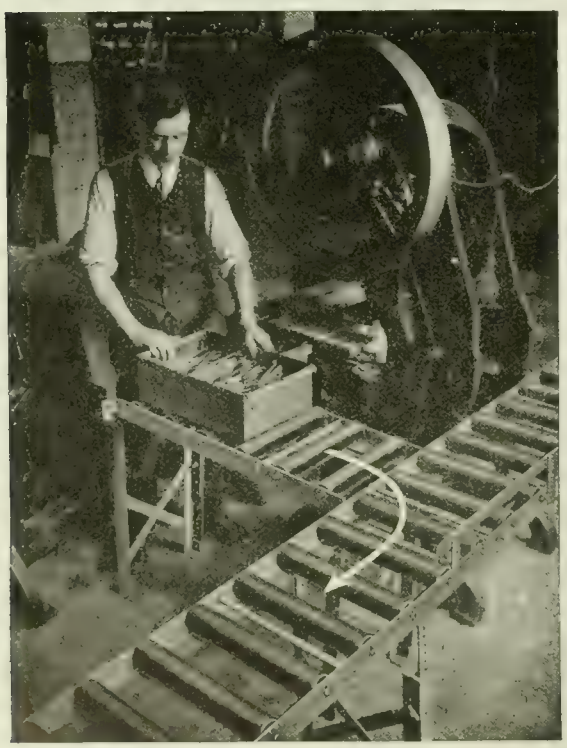


THESE CASE-HARDENING BOXES ARE STILL RED HOT, BUT BY USE OF THE GRAVITY SYSTEM ARE EASY TO HANDLE. THIS TRACK AS SHOWN CARRIES THEM TO HARDENING TANK, ANOTHER TYPICAL LAMSON INSTALLATION.

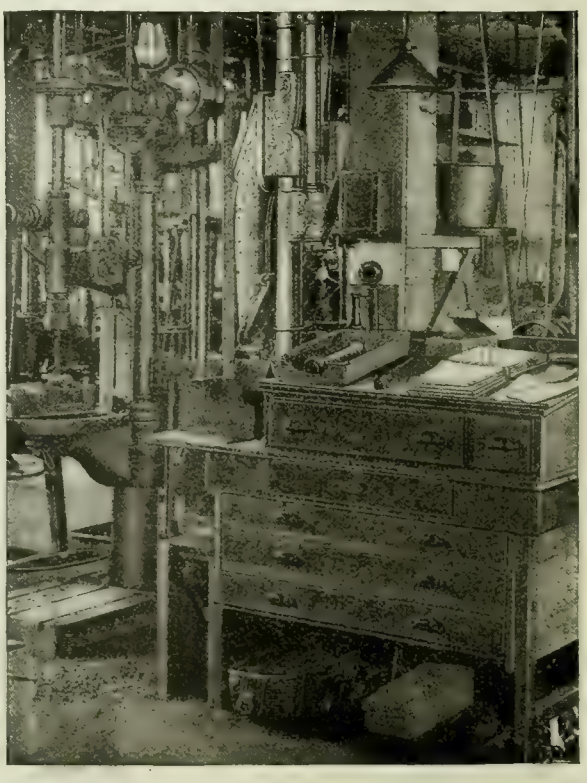
through partitions, around columns and obstructions, in fact they will carry your product wherever you want it.

Lowering devices, spiral chutes, spiral conveyors, boosters and elevators, all come within the scope of this gravity system. Each style has its own particular use and function. A study of the various illustrations throughout this article will really give a better conception to the reader than all the written descriptions are ever likely to do.

The gravity conveyor can be used out of doors to great advantage where rough products are handled. The food product plant, the general merchandise plant, the warehouse, the lumber plant, the department store and factory, the shipping department, the machine shop, the foundry, in fact practically all branches of industry have benefitted



THE OPERATOR OF THIS PRESS MERELY PLACES THE TOTE BOX ON THE CONVEYOR. THE LAMSON CONVEYOR DOES THE REST, AND THE OPERATOR NEVER NEEDS TO LEAVE HIS MACHINE.



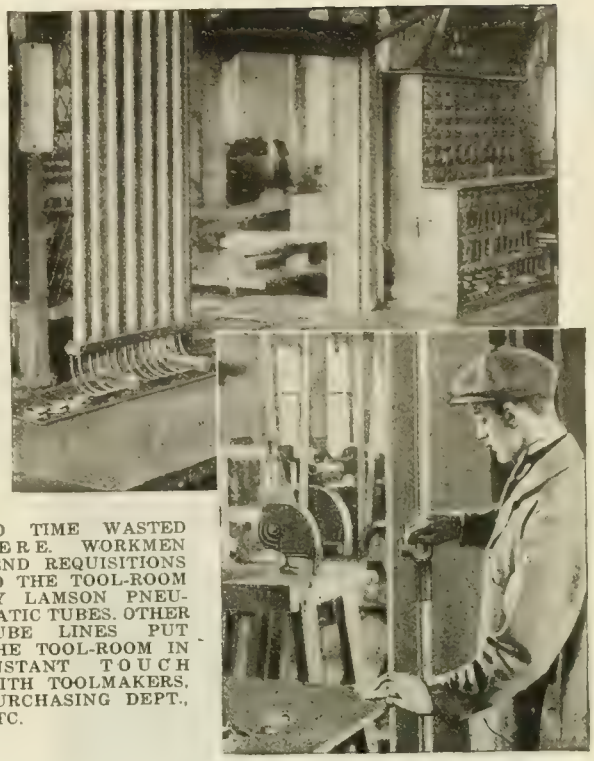
THE FOREMAN OF THIS MACHINE SHOP IS IN INSTANT TOUCH WITH THE MAIN OFFICE AND WITH EVERY OTHER DEPARTMENT THROUGH USE OF THESE LAMSON PNEUMATIC TUBES.

by the use of this system. It might well be said that its uses are illimitable, which prompts us once more to remark that it depends entirely on your own particular problem, what system of transportation you install.

Various Styles, Systems

Then there is the pneumatic tube system of transporting the various papers, orders and materials with great speed from department to department. To go into a detailed description of this method in an article of this nature is impossible, for such a subject is a study in itself. The tube system instantly centralizes all departments. A point not generally known is the fact that these tubes are sometimes as large as 3 in. x 6 in., oval shape, for carrying objects larger than the ordinary letters and general

TOOLS BY THIS METHOD ARE CARRIED WITH LIGHTNING SPEED ABOUT THE MACHINE SHOP OR MANUFACTURING PLANT.



NO TIME WASTED HERE. WORKMEN SEND REQUISITIONS TO THE TOOL-ROOM BY LAMSON PNEUMATIC TUBES. OTHER TUBE LINES PUT THE TOOL-ROOM IN INSTANT TOUCH WITH TOOLMAKERS, PURCHASING DEPT., ETC.

run of work. Tools to the machine shop are easily transported by this method, and the scheme is especially useful if the plant is large, and where a central office issues orders and instructions to the various departments. It practically links up the office and shop in such a manner that at a moment's notice they are in touch with each other if necessary. The use and extent of the tube system depends entirely on your plant conditions, and once more no hard and fast rule can be made in this regard.

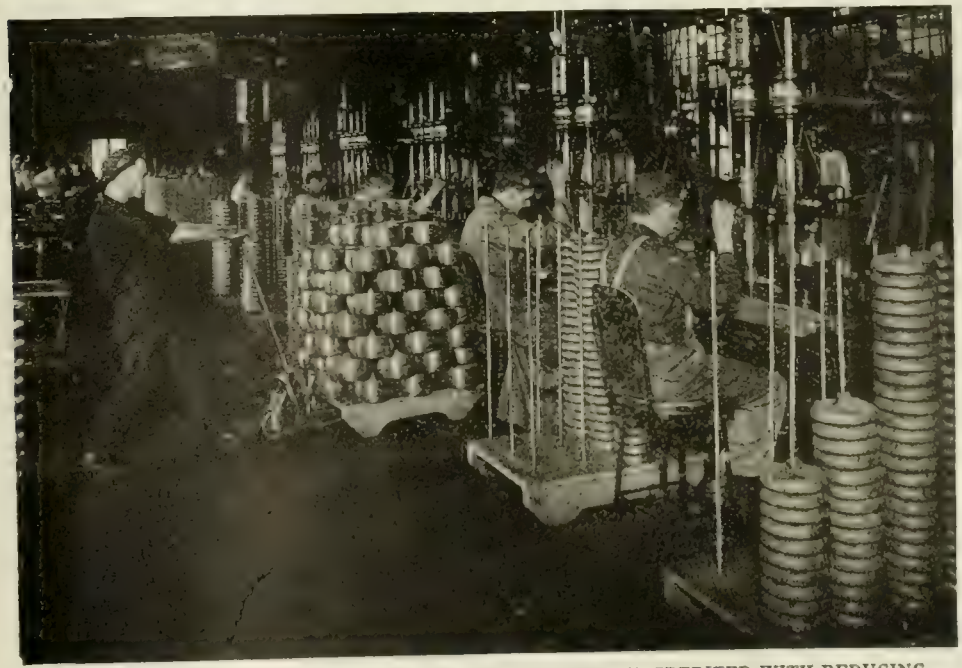
Another system of trucking in great vogue is that of the elevating truck. No doubt many people will be surprised when they learn that this type of truck is not yet ten years old, yet they are widely distributed throughout the world. The first truck of such nature is said to have been built at the paper goods plant of the White & Wyckoff Mfg. Co., Holyoke, Mass., in 1911.

This initial start, meant later the building up of the Cowan Truck Co., Mr. H. W. Cowan being the gentleman who superintended the building of the first truck.

This type of cost-reducer was termed the Cowan Transveyor, and such it is still called. The cost of trucking by this system was reduced to a wonderful extent, in fact a comparison is not amiss but well worth while.

Formerly stock was moved on ordinary trucks which cost from $10 to $25 each, and a sufficient supply for an ordinary factory ran into a large investment. Furthermore, the use of the old style truck necessitated piling stock at start, piling from truck to floor at destination and piling into another truck at destination and piling onto another truck later, when stock was desired in other departments. With the Transveyor system every wooden platform costing $1.50 to $5 becomes a truck the moment the transveyor is pushed under it. There is no piling or rehandling at start or finish.

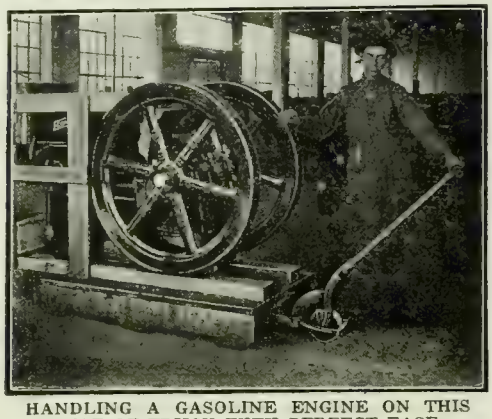
In addition to the economy of handling materials there is, too, a great saving of room as the empty platforms, really trucks, can be tested and piled high in a minimum space when not in use. This is really adding storage space or permitting more space for productive work, something which is not possible with the old style hand trucks.



A SYSTEM SUCH AS SHOWN OF THE COWAN TRANSVEYOR IS CREDITED WITH REDUCING THE TRUCK MEN 25%, STORAGE ROOM 50%, BREAKAGE TO ZERO, AND MAKING IT POSSIBLE TO REPLACE WITH CHEAPER LABOR.

The pleasing feature of the transveyor is that it starts immediately to lighten the labor and to reduce the cost of moving materials. In some factories the results secured in a single month repay the outlay on transveyors and platforms. After a short time other improvements are noticed such as a speeding up of the work in all departments, the promotion of system and cleanliness in the plant and the decrease of danger to stock by bursting water pipes, as the stock is removed from ordinary risk when piled on platforms instead of on the floor.

Although designed for use in paper plants the transveyor is widely used in plants of various kinds all over the world but especially so in the United States and Canada. Large fleets of elevating trucks may be seen hard at work in the largest industrial plants in these



HANDLING A GASOLINE ENGINE ON THIS TYPE OF TRUCK WITH PERFECT EASE.

countries and then again hundreds of small plants, especially machine shops are using a single transveyor daily. The device is used for practically the same purposes in all these places, namely to reduce the cost of moving material and to promote system.

To illustrate results which have been attained by the use of the elevating transveyor we quote the actual figures.

Mr. C. E. Stone, purchasing agent of the Chain Belt Co., says, "Seven men and ten ordinary trucks was our former need. Now five with the transvevyor system handles the work easily and saves us $1,050 yearly in labor cost alone.

YOU CANNOT HELP BUT NOTICE THE SAVING OF SPACE IN A SYSTEM SUCH AS ILLUSTRATED. NOTE THE ORDERLY APPEARANCE OF THE STORED WORK.

Terrance Scullin, master mechanic, Harvard shops of Cleveland Railway Co., comments as follows, "When we moved into new shops we needed equipment to facilitate quick handling of material in bulk to the various operations. Transveyors, because of their durability and ease of handling, made us quick to realize their value for our purpose."

Charles Kantenwein, foreman of the machine shop, The Winton Co., Cleveland, says, "Six Cowan Transveyors are now saving us $5,280 a year."

J. I. McCormick, engineer of methods of Republic Motor Truck Co., Inc., Alma, Mich., says, "The two transveyors and 200 skids cost less than half as much as trucks formerly used, and they reduced our trucking gang by 6 men, saving $5,400 a year, or over $16,000 to date."

These figures speak for themselves, and we leave the various illustrations of this system to speak with these figures.

It is hard to find any article used in industrial plants that became a success as quickly as the elevating truck and it will be just as difficult to find a plant that cannot make profitable use of the transveyor. Another point in its favor is that this style trucks are built in practically every style to take care of various conditions.

Another system of transportation is the tricycle method. This scheme is particularly adapted to the delivery of parcels too heavy for the pneumatic tube system yet too light for the trucking system. These tricycles are narrower and lighter than a truck, and are especially suitable for use in crowded aisles. The small cost is a big feature, and for mail delivery especially it is estimated that one tricycle carries eight times as much as one boy and makes the trip in less than half the time. In one plant alone these vehicles travelled a total of 14,295 miles.

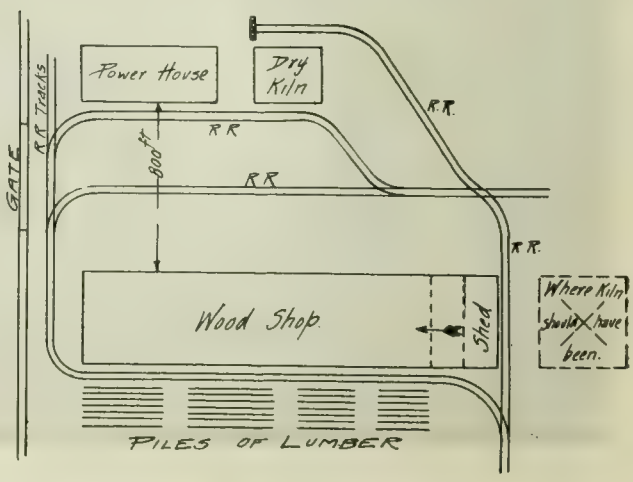
Girls in uniform often run these tricycles to good advantage, as they are light and easy to pedal. We show in the heading of this article an installation of such nature. Here again we realize that as a well known writer once said, "There is more than one way of skinning a cat. In other words the way to get over transportation problem depends on your conditions. Even after you have studied your conditions you will find yourself sometimes in a dilemma when you discover there is more than one way you could get around your trouble.

Caution, above everything else, is essential, for a step in the wrong direction means a loss of real money and time, not to speak of a user who would remark, "Transportation may be all right for others but not for me," while a step in the right direction means a saving in time and money, and an enthusiastic booster for transportataion methods.

The Danger Point

To illustrate the danger of choosing the wrong solution to your handling problem, the writer quotes two cases which came to his attention not so very long ago. The first case was as follows:

In a certain agricultural implement plant one of the products handled was that of long iron beams. To facilitate handling specially constructed trucks were made, but the fact was lost sight of that the problem of getting



PLAN VIEW OF THE ARRANGEMENT OF BUILDINGS.

these trucks into the elevator still remained. It was necessary to trannsport these beams up four stairs.

Too late they realized that while these trucks helped in certain ways, still the problem was not solved. Later it was solved in a very easy manner. An outside elevator, of double chain design, was made outside the building. At certain portions of the chain long hooks, or rests projected. Into these, lengthwise, were placed the beams. Upon reaching the proper height they went through a slot in the wall built specially to accommodate this work. The method proved highly satisfactory and saved this firm considerable money, not to speak of speeding up the work.

The next example, unfortunately, has not reached the stage of successful solution. To explain the blunder fully the writer has prepared a little sketch which is shown with this article to fully illustrate his point of view. Referring to this sketch readers can readily grasp the general layout of the buildings with which we are concerned.

In order to save steam pipes, this firm built their dry kiln near the power house, but in so doing proved the penny wise pound foolish theory. True, they saved in the amount of piping used, but since they have realized what an error they have made. Had they built the kiln at the portion marked with a cross on the sketch they would have saved themselves this extra handling trouble.

The kiln, however, went up near the power house, with the result that yearly this firm is losing considerable money, owing to the fact that the lumber must go through the following stages of transportation:

On entering the sidings on the cars it is first taken from the cars and hauled to the piling yard. Later it is taken from here to the dry kiln, a distance of over 1,000 feet, after which it is brought back over practically the same ground to the distributing shed. It is now passed into the wood shop itself, but not before all this wasted time, labor and expense has been spent on it. It will cost considerable money to construct a new building for kiln purposes, although, as this firm candidly admits, that is likely what it means in the end anyway.

From this illustration we cannot help but see that not only does the system of transportation enter into the solution, but also the routine of operations throughout the plant. It is sometimes good policy to change the system of routing to meet with the transportation system, should the corresponding result be worth while.

Which is the Most Profitable?

In an article such as this, dealing only with some various systems in use, we cannot attempt to advise which is most profitable. That problem is strictly up to you. What we will say, however, is this, that if you have no record of what your product is costing you to handle, ascertain this without delay, for it is a more serious matter than many imagine.

Having once discovered this point, then consider what it will cost you, should you adopt some method of transportation. Gather together data from the various firms throughout the country. You will find them eager to help you and the advice of their engineers is worth money to you. Having got this far, weigh the matter carefully, then decide on the scheme best suited to your requirements. Install this system, giving clear thought and judgment as to how it had best be installed to make it really efficient. After you have done this then you can sit back and feel sure that you are going to watch a transportation system in operation which is going to lower your handling costs and place more money for you in the treasury.

Throughout this article we have illustrated various installations together with data showing that mechanical means of transporting goods and material really brings results worth while.

We are indebted to the firms whose names are mentioned underneath the illustrations for the use of these photographs, and feel sure readers will benefit by a study of these illustrations.

VIEW IN A MUNITION SHOP, WHERE THIS TYPE OF TRUCK WAS USED TO SPLENDID ADVANTAGE.

Growth of The Geo. F. Foss Mach. & Supply Co.

Close of the War Brought a Situation That Led Them to Equip Plant For the Rebuilding of Used Machinery—Large Business Grows From Small Beginning

THE steady expansion of the Geo. F. Foss Machinery and Supply Co., Limited, of Montreal, has been an outstanding feature of the past eight years in machine-tool activities. Circumstances have proven a great ally in bringing the business up to its present high standard of service and efficiency, but it is mainly due to the ability and integrity of Geo. F. Foss and his able associates, that this firm now ranks as an equal to many of those of longer standing.

It was in the year 1911 when Geo. F. Foss, then a traveling salesman, decided to branch out on his own account, and, with Mr. M. A. Fuller, established the firm of Foss and Fuller, occupying a small office on St. James St., in the leading machine-tool district of Montreal. Success followed closely on the initial efforts of the new firm and at the termination of the first year's business, the interests of the junior member, Mr. M. A. Fuller, were purchased by Mr. H. W. Hill. Continued success followed the partnership of Foss and Hill, and in November, 1917, the interests of Mr. Hill were taken over by Geo. F. Foss, and the latter formed the incorporated company of the Geo. F. Foss Machinery and Supply Co., Limited.

For many months prior to the formation of the present company—during 1916 and 1917—the country's demands for machinery to take care of the munition requirements of the Empire, necessitated the concentrated efforts of every machinery house in Canada, in co-operation of manufacturers, for the scheduled production of shells and other war supplies. That the firm of George F. Foss Machinery and Supply Co. was among the leading houses in this respect was exemplified in the remarkable growth of the past two years. At the time the present company was incorporated they were housed on the ground floor of the four-storey building at 305 St. James St. The phenomenal development of the business, during the year 1917, meant that additional office and show-room space would have to be acquired for the steadily increasing business. Incidental to the formation of the present firm, therefore, the second, third and fourth floors of the building were taken over, and this extension provided further opportunity to entrench themselves into the good-will of their customers, who had faithfully supported the sincere efforts in their behalf.

Another Development

The termination of the war and the cessation of all activity in connection with the manufacture of munitions created a situation unprecedented in the history of the machine-tool industry, where the country was virtually flooded with machinery of every description, and ranging from brand new tools to old and used equipment. The solution of the two extremes was a comparatively easy matter, as the first was taken care of in the usual way, while the latter was immediately relegated to the scrap heap, or sent to the cupola. The vital problem was the disposal of the tools that had seen varying periods of service in shell making and had destroyed their efficiency for ordinary domestic work. The volume of standard machine tools in this category was of considerable proportion, and something had to be done to reclaim such tools, and make them fit for useful service. To this end the Geo. F. Foss Machinery and Supply Co., Limited, have purchased a large building on Brennan

GEO. F. FOSS.

HEAD OFFICE AND WAREHOUSE OF THE GEO. F. FOSS MACHINERY & SUPPLY CO.

REBUILT MACHINERY WAREHOUSE OF THE SAME FIRM.

St., formerly owned by the Canada Metal Co., and after making extensive improvements to the property established a warehouse and machine shop and will devote it to the rebuilding of second-hand machine tools and other used equipment. The purpose of this new department is to overhaul such tools and make them as accurate as any new machine.

The firm now have ten traveling salesmen constantly on the road, covering the whole of Canada. They also have a branch established at Sault Ste. Marie under the supervision of R. H. Wood as general sales manager for Western Canada. The personnel of the firm is Geo. F. Foss, president; Chas. W. A. Moore, vice-president; W. A. Downing, advertising and small tool manager; A. G. Clarke, secretary-treasurer.

The Personnel of the Firm

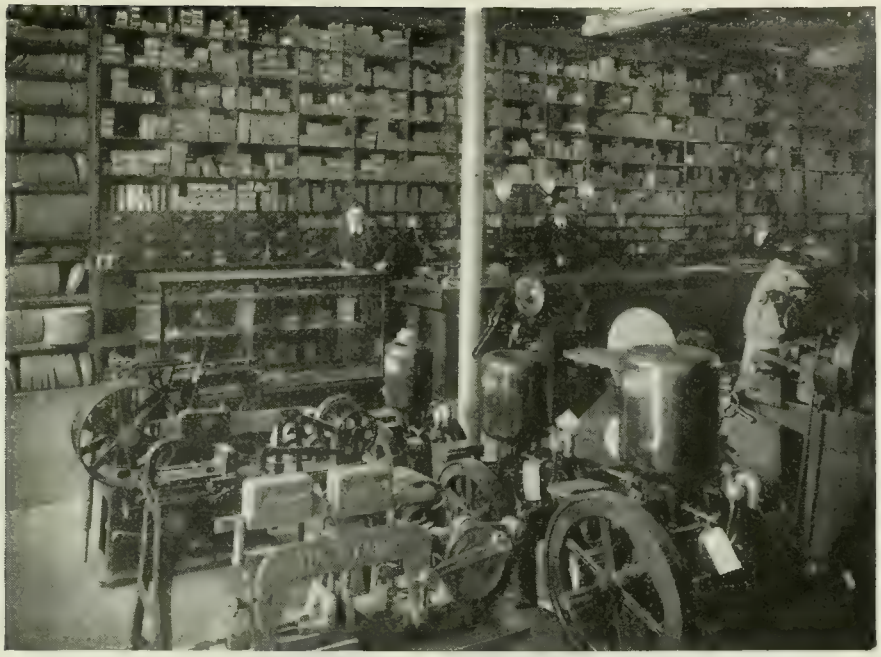
George Foote Foss is a Canadian by birth, being born in Sherbrooke, Que., in the year 1876. His early education and mechanical training was obtained through various scopes along the mechanical lines of machinery and electrical equipment. His business career started in the year 1911, entering into partnership with Mr. Fuller, and later forming the present company of the Geo. F. Foss Machinery & Supply Co., Limited, of which he is now president.

Chas. W. A. Moore, the manager of the machine tool department, is a Canadian, born in Toronto in 1880, but when yet a lad removed with his parents to the Town of Lachute, Que., where he obtained his early education. At the age of sixteen he came to Montreal, where he served in several of the more important machine shops for different periods. In 1906 he accepted the position of fore-

A. G. CLARKE, Accountant.

W. A. DOWNING.
Manager of Advertising and Small Tool Department.

CHAS. W. A. MOORE,
Vice-President and Manager of Machine Tool Department.



SMALL TOOL AND MILL SUPPLY DEPARTMENT.

GENERAL VIEW OF THE MACHINE TOOL DEPARTMENT.

man with the Allis-Chalmers-Bulloch Co., and after three years with this firm was appointed to the position of superintendent of the International Steel Co. of Montreal. He served in a similar capacity with the Buffalo Forge Co. and also with the Hall Engineering Co. of Montreal. In 1915 he became associated with the firm of Foss & Hill, and has been connected with this firm throughout its recent re-organization under the name of the Geo. F. Foss Machinery and Supply Company.

W. A. Downing, advertising and small tool department manager, is a native American, born in Waltham, Mass., 1888. His boyhood was spent in Waltham and Boston, and his engineering experience was obtained through many of the leading machinery manufacturers throughout the United States. He has specialized on small tool equipment, serving with many of the leading manufacturers. He became associated with the Geo. F. Foss Machinery & Supply Company, Limited, about three years ago and was placed in charge of the small tool department, being later appointed as advertising manager.

A. G. Clarke, accountant with the Geo. F. Foss Machinery and Supply Company, has had this position for the past five years. Prior to his present connection he was three years with the Amalgamated Asbestos Company, and three years with the Canadian Car Company, in a similar capacity.

Several times during the same season heavy floods lifted a large wooden pipe line, supplying a hydro-electric power station clear of its supports and battered it against its ballast bed. Yet examination at the end of the season showed that the pipe was perfectly sound and had retained its circular shape throughout. This is noteworthy, as the pipe was almost four feet in bore, was strengthened only by loops, and was anchored only at the intake. It seems to indicate, too, that wood-stave pipe is a great deal stronger than is generally supposed, and is well fitted for use in hydro-electric plants.

A new device for softening the seals of storage batteries by steam works automatically. A steam generator, a steaming box and a water supply tank are its essential parts. The generator consists of a small cylindrical tank placed over a little gas, oil, or gasoline stove. It contains a small float which operates a plunger to close the water in-take valve as soon as the water reaches a point about three inches from the bottom. In this manner the amount of water in the tank is automatically controlled to remain constant so long as the outside tank is replenished and the mechanic can put a battery in the steam box and leave it without attention while the seals are being softened, while he does other work.

ACCOUNTING DEPARTMENT.

OFFICE OF THE PURCHASING AGENT.

WELDING AND CUTTING

Interesting Examples of Welding and Cutting

Discussing the Oxy-Acetylene and Oxy-Hydrogen Methods, Together With Detailed Data, Covering the Examples Illustrated —The American and French Torches Are Described

By FRANK C. PERKINS

THE accompanying illustration, shows the cutting of a 36 in. shaft by means of an American cutting torch, developed at Boston, Mass., the details of construction being indicated in drawing, Fig. 2. The welding and cutting torches, noted in Figures 3 to 9, indicate the methods of oxy-acetylene welding with torches, developed at Bordeau, France, by Maurice Ledoux & Co.

This American cutting equipment is extensively used in steel foundries for cutting off risers from 6 in. to 26 in.; in larger forge shops to cut billets, shafts or squares out of crank shafts; in junk yards to cut up heavy stock. It is used on all warships liable to get into action for the quick removing of debris. A small investment of a few hundred dollars will save millions of dollars invested in a ship and many lives besides.

The pictures of the 36 inch cut show plainly how this torch just walks through these heavy thicknesses. There have been very successful hand cuts made on 26 in. solid and 36 in. hollow shafts. In short, the equipment has proven to be reliable and easy to run. Interesting speed tests made by operators of the Watertown Arsenal on 15 in. risers show cuts made in 9 and even 8½ minutes, the cuts being as clean as if cut by a saw—an excellent performance, as will be admitted.

CUTTING 36-INCH SHAFT WITH CUTTING TORCH DEVELOPED AT BOSTON, MASS., BY THE GENERAL WELDING AND EQUIPMENT CO.

The Boston Bulldog cutting equipment is a heavy duty equipment, therefore every part of it is specially constructed for this work. The regulator is one of exceptional dimensions. It carries a safety release built on the principle of a regulator, set to blow off at 250 lbs. pressure and is attached to a manifold so as to connect 4 oxygen cylinders with this one regulator. This produces an even flow of oxygen. As a combustible gas, hydrogen is preferable, as its chemical action is steadily keeping the slot clean which increases the cutting action of the oxygen. Oxy-hydrogen has a peculiar action on the tip holes, clogging their outlets up after a while, and for good working conditions, the hole outlets have to be reamed out once in a while in order to preserve their original width. Otherwise there is nothing to interfere with the perfect working.

The American welding torch is carefully designed, so that the mixing chamber mixes the oxygen coming through

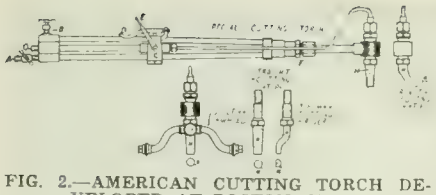


FIG. 2.—AMERICAN CUTTING TORCH DEVELOPED AT BOSTON, MASS.

the centre hole into which the acetylene is sprayed in through a number of fine side holes, thus producing a perfect mixture. The handle is screwed onto the torch base and can easily be removed by loosening a set screw. Four large vent holes are drilled through the base and the mixing chamber castings, so as to procure a perfect ventilation. The thread for acetylene is ¼ in. pipe and for the oxygen inlet ⅜ in. pipe, so that the hose cannot be connected wrong. The mixing chamber is far removed from the tip end or heat zone. The unmixed acetylene can therefore not get overheated and cause flash-backs through decomposing, nor can it get so hot as to carry in expansion and cause fluxions of the mixture, thus changing the character of the flame. The flame, once set neutral, will stay neutral, regardless of the varying heat at the tip end.

If it is desired to see the difference between a torch mixing in the head and one as shown, mixing far away from it, it is only necessary to try both on a deep, heavy break, where all the heat comes back on the torch end. The former will soon start flashing every few minutes, and the latter will operate without interruption. Naturally, the weld can then be made in less than half the time and with less than half the amount of gases. The flame will keep absolutely neutral and the weld will be strong and uniform. Rubbing the lighted tip against flat faces and showing that the tip will not flash, never proves how a torch will work under really trying conditions.

It is claimed to be a combination welding torch, that is, a torch base with two extensions is used, so as to have either a 16-inch long torch or a 22-inch long one. In special cases, a still longer extension can be supplied to make the torch 30 inches over all. Thus the operator can just connect that extension which is the most suitable for his work. There is no need of having several torches of different lengths. One torch base with the two or three extensions would practically give you two or three torches in one. Every length of torch is well-balanced, as the principal weight is in the handle and the torch end is so non-obstructive that even difficult spots can easily be reached. Each torch is supplied with a set of nine tips, able to do all possible work. Every tip can be regulated within wide limits from full heat down to ¼ heat without ceasing to work properly.

Aside from the gas consumption of the preheating flames, which is only a small percentage of the total consumption, the main expense is the oxygen used for the cutting and in order to get a real idea for this expense, it is necessary to start from the theoretically necessary amount of oxygen to burn the iron or steel out of a slot of a certain size, and to figure out how many cubic inches have to be burnt out. You then find that burning out a slot of ⅛ inch width in a 1 inch plate over the length of 1 foot, we have to use a minimum of 1.9 cubic feet of oxygen. For 2 inch plate it would be double and for other sizes in proportion. A 1-16 inch to 3-32 inch slot would be about the regular width when cutting thickness of 1 inch and over by hand.

For smaller stock and when cutting with a machine, this slot could be reduced less than 1-16 inch and therefore the theoretical consumptions cut down in proportion. All these finer cuts have to be made with specially fine type, which need special care to keep them in shape and must be operated by a first-class man. They show what can be done under special conditions, but would not prove a success when made by the average class of men.

This theoretical consumption is, of course, far below the amount you really consume, because it refers to pure oxygen and pure iron. Now, the commercial iron and steel contain carbon and sometimes special ingredients, as nickel, manganese, vanadium, etc. If the carbon goes to such a percentage as in cast iron the oxygen will not cut any more and from this you may see how the consumption of oxygen increases with the percentage of the ingredients. Furthermore, commercial oxygen is not absolutely pure, 99 per cent. being a good average for the electrolytic oxygen and 97 per cent. the average high mark for oxygen made from air. Practical tests with cutting show, however, that the oxygen consumption increases 25 per cent. if you cut with 97 per cent. pure oxygen against a 99 per cent. pure one.

Then there is some surplus of oxygen

FIG. 4.—FRENCH TORCHES OF MAURICE LEDOUX & CO., OF BORDEAUX.

FIG. 3.—OXY-ACETYLENE WELDING BY MAURICE LEDOUX & CO., BORDEAUX, FRANCE.

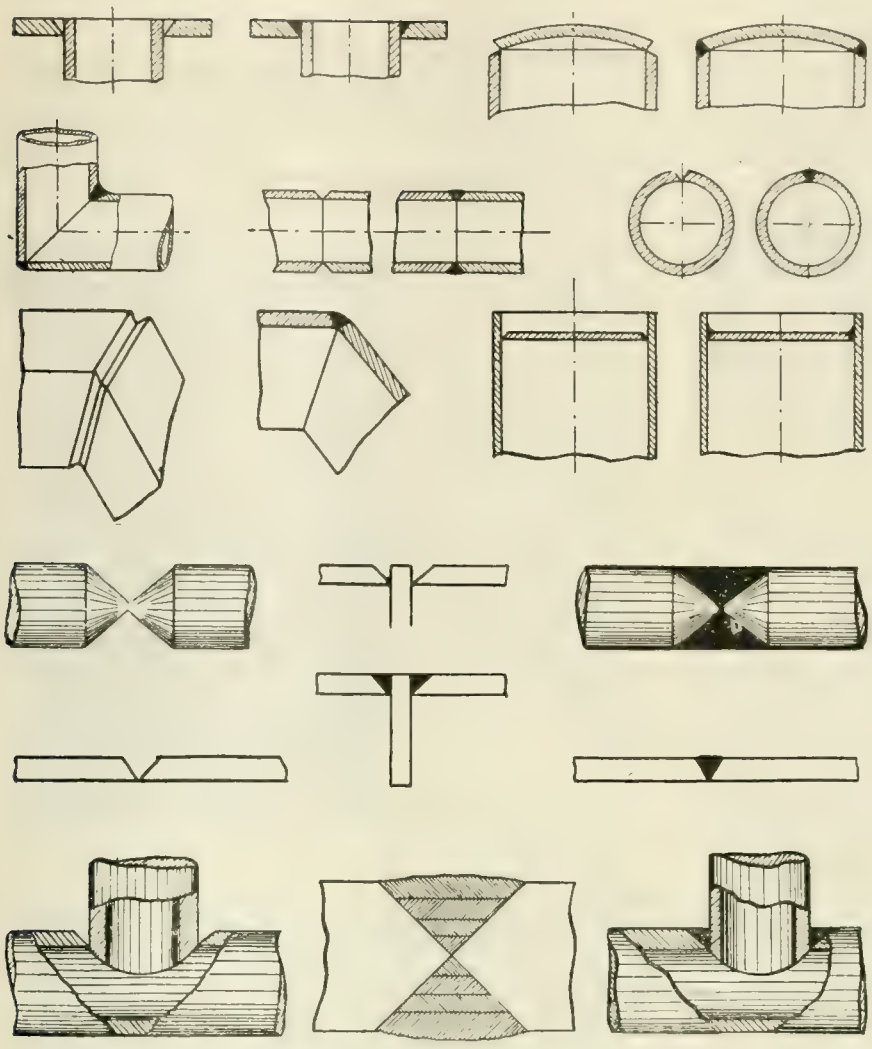


FIG. 5.—EXAMPLES OF FRENCH WELDING METHODS.

necessary to blow the burnt iron out of the slot. Then there is the human element. Some operators cut slower than others, or have an unsteady hand, which means a wider and longer cut. Others move the cutter too quickly and do not cut all the way through and have to cut parts over again. Others use pressures far in excess of what is needed and simply waste oxygen. Then a great deal depends on the kind of an oxygen reducing valve you are using. Only the best kind of valves feeding without vibrations, such as our double diaphragm valves with forcibly guided seats, are good and economical for cutting. Finally there is a great difference in consumption if the iron or steel is rusty or full of scale, or if you have to cut through several plates bolted or riveted together.

It is stated that the bulk of cuttin is done with oxygen and acetylene as a preheating flame, and for thicknesses up to 1 in. and even 3 in. to 5 in. it might be handier; but when it comes to heavy cutting, from 5 in. and up, and hydrogen can be supplied at a reasonable price, hydrogen is preferable. Whenever it comes to heavy cutting, 8 in. and more, hydrogen should be used exclusively, if easily procurable. The oxy-hydrogen flame is not so easily adjustable as the oxy-acetylene flame, as the cone is difficult to see. Therefore, it is a little hard for the beginner to adjust the preheating flame right. In some instances hydrogen could be mixed with a small percent. of oil gas and then the cone comes out bright.

Another gas for cutting is the so-called "Drigas," a light oil-gas which does not liquefy when compressed into cylinders. It is good up to 8 in. cutting. In the natural gas district, natural gas can be used to advantage. Heavy thicknesses averaging between 2 in. and 5 in. can be cut with any of the mentioned gases, and it is more a calculation if these other gases can be as easily procured as acetylene, and if the price of the gases is favorable. If the price of acetylene is 2 cents per cubic foot, the other gases must not be higher than 1¼ cents per cubic foot, in order to compete commercially. For every heavy cutting, however, hydrogen is the only gas to use to advantage. For cutting in narrow places, as inside of boilers, many prefer compressed oil-gas, regardless of the thickness to be cut, as this gas has the lowest explosive range of any of the gases mentioned. Should a hose be damaged in these tight places and catch fire, it is better for the operator to face a lazy burning and very little explosive gas than acetylene or hydrogen.

Expensive brass and bronze brushings are often thrown out of production and consigned to the scrap pile at inspection benches on account of being turned undersize. These may be saved by building up the diameter with copper plating, the expense of so doing usually being slight in comparison with the value of the article.

The old Greek custom of hurling into space their spears, arrows, etc., by means of the catapult, is proving mighty handy in these modern days, for we now launch our airplanes by this same scheme. The catapult runs on a two-rail platform, and is operated by compressed air. The installation is used on board ships, and has proved a decided success.

When silver-plating steel or brass articles, much annoyance is caused by the scaling off of the silver during the burnishing process. This may be very easily avoided by immersing the article for a few minutes in a hot solution of potash or soda, and rinsing it without handling in water. It should then be dipped in dilute nitric acid, removed and scoured with a stiff brush or fine sand if necessary. Attach the wire, dip it again momentarily in the acid, pass it rapidly through clean water and immediately place it in the circuit in the bath.

Many mechanics have had their patience sorely tried when pouring lead around a wet or damp joint, to have it explode, or scatter from the steam generated by the heat of the lead. This blowing may be avoided by putting a small piece of resin into the ladle and permitting it to melt before pouring the lead.

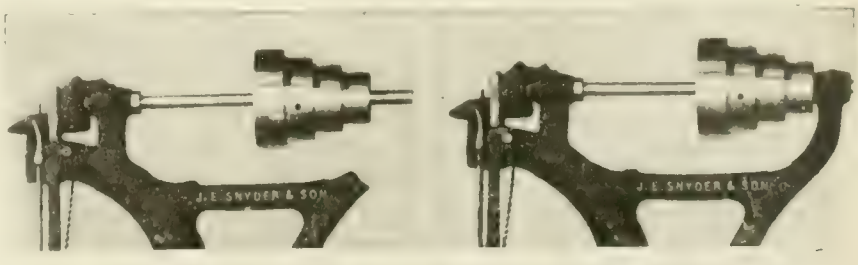


FIG. 6.—A DRILL PRESS HEAD, BEFORE AND AFTER WELDING.

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Let Us Get To Work

"WE had considered closing down until next season, but we have decided to go ahead just as soon as we can get the men back in the shop."

That is one of the finest speeches it has been our good fortune to hear for some time past. The firm in question had stated, not ten days ago, that the selling season was passing and they would have no particular call for their output now as it would be too late.

The closing of that shop for the rest of the season would have meant that hundreds of people would have to look elsewhere for employment. It would mean that a Canadian product would not be as definitely and as largely on the market next season. It would mean that a large and efficient organization would have been more or less disrupted.

But the place is going to work. Chances are that this morning the doors are open and things are getting under way.

In other words they are going to work.

We are suffering from lack of production.

Less production per capita is not going to help wear down the 4½ per cent. exchange rate that is smothering Canadian money in New York.

Less production per capita is not going to make conditions in the shop any better for the men who work there.

Less production means less to sell, less to put into the pay roll, less to expand with, less to build decent factories with, and less to go out and find new markets.

For almost five years we have been working at destruction. For six months thousands have held back owing to strikes. We are where we are in spite of conditions, rather than by their assistance.

Now, then, let us get to work. Tinkering with conditions can easily be carried to such lengths that the tinkers on both sides will find they are not able to step up and put the peg in when they wish to call a halt.

Creating New Conditions

THE striking machinists in Toronto and some of the other centres have returned to work. The strike was neither a total failure nor by any means anything approaching a success.

The best thing for both sides is to forget it and work as hard at building up conditions that will make strikes impossible, as they have in bringing about and fighting strikes.

There are new conditions coming into industrial life. Only the self-blinded cannot see them.

The manufacturer who is going to win is not going to run his shop on the card-index system.

A man has got to be something more than a number on the time clock.

If efficiency systems would bring about the best feelings between shop and office this would have been brought to pass long ago.

You say there are too many men in your shop to know them all. Perhaps, but that is no reason for not making the effort.

Do you enjoy the confidence of your men? Did you ever stop to inquire how they were getting along? Ever take an interest in anything that concerns them?

We know manufacturers who are having the best possible time by thinking about the men who are working in their shops. They go out of their way to become acquainted with their pay roll. Do they lose anything on this account? Just ask some of them.

They are getting something more than a day's work. They are nipping strike talk in the bud. They are building up an atmosphere where a strike would be regarded as injury in the house of a friend.

The employer can take the initial step in this direction. We believe in many cases he is willing to do it. The men will respond. Do not take it for granted that they will not.

Buried Treasure Again

THE uncovering of lost treasure from the bed of the ocean has exerted a fascination over the minds of men from early times. From day to day new schemes for salvaging sunken vessels are sprung on an expectant world, to dazzle susceptible minds for a few brief moments and then fade away from sight and memory. Most of these schemes would be perfectly practicable if it were not for certain fixed and immutable laws of nature. One of the most important of these is that every 2.3 feet depth of water exerts a pressure of 1 lb. per square inch on the surface of any object immersed in it, the effect of this pressure being to set very definite limits at which diving operations can be conducted.

One of the latest of these schemes has been evolved by the United States Ship Salvage Participating Syndicate. They have borrowed the famous tank from the battlefield, and are going to ask it to become an amphibious animal, and conduct constructive work on the bottom of the sea, instead of destructive work on the surface of the land. The tank can be built with strength to withstand the pressure of the sea at whatever depth it is necessary to operate. It will be directed from above electrically, and in order that the operators can see just what it is up to, an instrument called a "subsea visionscope" has been invented. The idea is that the tank will be lowered to the bottom of the sea, carrying wire cables, the ends of which are brought up to the surface on each side of the sunken vessel. All being ready, the operator on the surface applies the current, at the same time keeping a watchful eye directed down the subsea visionscope. The tank immediately gets busy burrowing under the wreck thus passing the cables under her bottom. Air containers are attached to the ends of the cable and inflated, upon which the buovancy of these air vessels raises the vessel from the bottom.

Could anything be simpler?

Here is a chance for those who are getting bored with the tameness of the mining market to get a little quick action. The syndicate is going to be capitalized at $5,000,000, in $1 shares, so there is really no reason why everyone should not get in.

Now that one cannot put a little bet on an "also ran," the romantic interest of these salvage operations should have an appeal all its own.

Has Designed Many Cars

FEW automobile engineers can equal the record of J. G. Perrin, who has recently been appointed assistant general manager and chief engineer in charge of production of Willys-Overland, Limited, Toronto.

Like a good many men who have made their mark in America's third greatest industry, Mr. Perrin began his career in the bicycle business. He started with the H. A. Lozier Company, bicycle manufacturers, Toledo, Ohio, as a draughtsman. Later he went into the machine shop, and after serving there for a number of years, through various departments, he returned again to the engineering department. Shortly afterwards he became chief engineer of the company. In 1897 the Lozier steam carriage made its appearance and was the first of many famous cars to be designed by J. G. Perrin. The first fore-door car built in America, and the first streamline car were Perrin productions. Lozier cars of Perrin design figured prominently on the speed ovals of the world, and have captured "first money" time and again. Among the notable Lozier winnings was the Vanderbilt cup in 1911. Following this, Mr. Perrin was appointed vice-president and chief engineer over the combined works of the Lozier Motor Car Company of Detroit, Mich., and Plattsburg, N.Y.

J. G. PERRIN.

After twenty years' service with the Lozier Company, Mr. Perrin became chief engineer of the Timken Detroit Axle Company, where he remained until the war, when he was called to Washington as a member of the Aircraft Production Department. Through this work he came into touch with aircraft division of Willys-Overland, Limited. At the instance of that Company, and with the consent of the U.S. Government, Mr. Perrin assumed charge of the aircraft division of Willys-Overland, Limited, at Toronto. Before the close of the war his company were producing five complete eight-cylinder Sunbeam Arab airplane engines in an eight-hour working day. In this work Mr. Perrin achieved the distinction of winning the commendation of the Air Board, which was prompted by the high quality of the workmanship exhibited in these Canadian-built, British-designed airplane engines.

He is now devoting most of his time to the perfecting and production of the new "Overland 4" car, a light automobile that is expected to embody improvements of a rather revolutionary character.

A small electric water heater, only 12 in. high, is now manufactured for attachment to faucet, directly or with a rubber tube. The water then flows through porcelain tubes in which non-corrosive resistance coils heat it progressively to the required temperature. The faucet from which the heated water is finally drawn is so associated with the electric snap switch that the current is not turned on until the hot water is actually wanted. If cold water is desired, the faucet handle is thrown in a reverse direction, causing the water to flow through an unheated by-pass. The machine can heat about 30 gal. an hour, using either direct or alternating current.

Joins Rudel-Belnap

MAJOR T. E. Ryder, D.S.O., M.C., who has just recently returned from overseas after four years' service in France and Belgium with the Canadian Field and Siege Artillery, has been appointed general manager of the Rudel-Belnap Company, of Montreal and Toronto, with headquarters in Montreal.

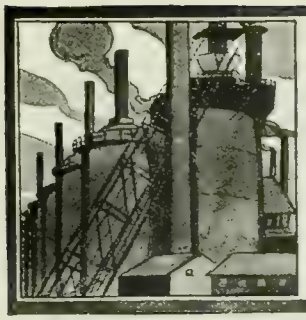
MAJOR RYDER, D.S.O., M.C.

For over ten years prior to the outbreak of the war, Major Ryder was connected with the Canadian Fairbanks-Morse Company, and was in charge of their transmission business in Montreal until 1908, when he was sent to St. John, N.B., to open a new branch for the company, remaining as manager until he enlisted for overseas service in the fall of 1914.

Liners 1,000 Feet Long

EVIDENTLY the race for the blue ribbon of the Atlantic is not to be dropped. From Washington, D.C., comes the announcement by the United States shipping board that two vessels are to be built which will have larger dimensions and greater speed than any liner afloat. Their length will be 1,000 feet, beam 102 feet and depth 74 feet, with a gross tonnage of 55,000. The passenger accommodation will be for 1,000 saloon passengers, 800 second cabin and 1,200 steerage, while the crew will number 1,000. The vessels will be of 100,000 H.P., oil burning, and will have enough fuel capacity to enable them to make a round trip without taking in fuel. They are designed with a view of becoming commerce destroyers in time of war, and will have gun emplacements included in the structure.

Nothing is mentioned about the draft of water that these vessels will require, but it is significant that they will have a terminal at Montauk Point, 118 miles from New York city. The depth of the Ambrose Channel is forty feet, and a vessel of the size mentioned would have nothing to spare there. The "Lusitania" drew 35 feet 2 inches. This is the factor that limits the size of vessels more than any other. It is no use building a vessel that cannot find a harbor to go into, or that cannot be dry-docked owing to the lack of a dock large enough to take her. The question of speed involves two considerations, the one being the increased consumption of coal, and the other the saving in maintenance of passengers and crew by being one to two days less on the voyage. First cost is greater for the higher speed vessel owing to the greater weight of machinery required. If these ships are built it is quite likely that they will hold the laurels for some time, as the building of ships of extraordinary speed and huge dimensions is not likely to be attempted by other nations at present. These vessels are always a good deal of a luxury, and are almost invariably heavily subsidized by their Governments. The large-sized, moderate-speed vessel is another proposition, as space that is devoted to machinery in the high speed ship can be utilized for profitable purposes, the fuel consumption is considerably less, and the difference in time occupied not amounting to more than about 18 to 24 hours.



MARKET DEVELOPMENTS

Strike Settlement is Good Piece of News

Tool Room Output is Needed in Several Cases—Industries Have Decided to Go Ahead With New Lines—Metal Market Showing Great Deal of Strength in Many Lines

THE announcement that the machinists' strike has been concluded in Toronto and district is naturally good news to the machine tool trade. It may take some days to get things under way in some plants, but work will be facilitated in many ways in a short time. Tool room output is needed in several cases where new lines are contemplated. It has been necessary in some cases to send across the line for this, causing delay at a very inopportune time. Not only so, but several firms have changed the decision of some few weeks ago to shut down for the remainder of the season, and will, as soon as mechanically possible, go ahead with the turning out of new lines that should have been placed on the market this season. It will require some little confidence, but the decision has been made to go ahead and manufacture now, trusting to a vigorous selling campaign later on to see them safely through.

"The best week this year," was the manner in which one leading machine tool dealer referred to the business closed by his house during the past few days. The fact is that those who were waiting for lower prices before coming into the machine tool market are being left with very indefinite delivery dates and at prices higher then they could have secured shortly after the signing of the armistice. Increases have been made in several lines. In one case in particular quotations that were made to a large Canadian concern on chain blocks have been withdrawn. The figures were given in the middle of June, while now an $87 article has gone to $112, and others in proportion. Reductions have been made on high speed cutters, both Canadian and U.S. makes.

Buying of supplies is improving. The National railroads are in the market this week for 1,500 carbon drills and about 50 of the high speed variety.

The scrap metal market is showing exceptional strength. Machine scrap is very scarce, and the higher figures are not bringing out any offering to amount to anything. It was thought that war shop material would come in under this. It may be that higher prices will have to be offered. Coppers continue strong, and a slight advance has been made in tin for the first time in some weeks. Mills and foundries are buying heavily of scrap material, as many of them had bare yards, waiting for conditions to become a little more settled before stocking up.

CONFIDENCE MORE MARKED IN TRADING IN MONTREAL MARKET

Special to CANADIAN MACHINERY.

MONTREAL, Que., July 31.—We have all been looking forward for the turn in the tide that has been promised as a result of the signing of the peace treaty, but the change has been so gradual that it cannot be rightly said to be a turning point.

From every angle comes reports of better business; steel interests are encouraged by the better feeling that prevails, although no heavy buying is taking place. Sales of plates and shapes have shown a slight increase, but little attention is given to future requirements. Salesmen are again coming into their own and the question of the disposal of materials is again to the fore. Consumers are less concerned about delivery now but are reluctant to buy heavily for future needs. Machinery dealers are encouraged by the steady return to normal business. One large machine tool house here has established a well-equipped machine shop for the repair and rebuilding of used equipment. Sales of new tools are gradually increasing. A phase of activity that tends to keep metal shops active is the fact that manufacturing rights are being obtained in Canada for English and American lines, many of which are being assembled in a plant apart from those in which the various parts are made and machined, frequently several places being employed for turning out the work for the assembly shop. The metal market reflects the general activity in the better demand and higher prices quoted.

Old materials are moving more briskly and advances are general on a very strong market.

Better Demand Puts Metals Up

The anticipated requirements of Germany and Austria in respect to copper have had no direct effect on the present market, but the possibilities in this direction are undoubtedly an unconscious factor in the remarkable strength of copper. The export prospect, together with the fact that domestic demand is steadily growing, are the two prime factors in returning copper to the position it held during the last year of the war. One dealer here stated that he considers copper reasonably cheap at the existing price, in face of the general conditions that prevail in all circles. It would not be a surprise to him to see copper go still higher. Tin is quite active just now and although a better volume of metal has been coming into Canada, the consumption has apparently equalled the supply. The restriction on the imports that has been in force in the States since the termination of the war may soon be removed, as it is thought that the Government has disposed of nearly all the surplus metal held over since war demand ceased. This change will probably open the way for many months, but no sharp decline is expected here; in fact it may mean a stronger market here for a short period until a balance has been struck. Local price on tin is 57 cents per pound, a 2 cent advance on last week. Business activity generally is responsible for advances in other

metals. Spelter is up ½ cent, the quotations being 10 cents per pound. Lead at 7¼ cents is ¼ cent stronger. Antimony is up 1 cent, the price quoted being 10½ cents per pound.

New Demand Increasing

Activity in machine tools is gradually returning to a basis when competition is a contending factor. The volume of business is far from that of a year ago, but is of a kind that tends to stabilize the market. Whereas the average war demand was for machinery contracts running into hundreds of thousands of dollars, the wants of the manufacturer today are on a much more conservative basis, but the distribution is over a much greater area. This, in itself, is a more encouraging feature, as it indicates a steady return to normal conditions. Sales of second-hand equipment are still in front, but the percentage is gradually swinging around. The relative ratio at present is approximately 60 per cent. on used and 40 per cent. on new equipment, with the latter constantly increasing. Demand for supplies is steadily growing better, and confidence in the trade is much more general. One dealer here stated that during the next few months they expected business would pick up considerably.

Scraps Advance to Higher Levels

Without question the situation in respect to scrap conditions is of a very firm character, and the general movement of material, both buying and selling, is of considerable volume at the present time. Emphasis, however, may be placed on the fact that purchases by the consumer are principally for early requirements, future needs receiving little consideration. During the past week it was announced that several thousand tons of scrap was to be shipped to Britain in the space reserved for Government purposes. It seems that this material is war supplies, owned by the Government, and in some instances the scrap is in the form of finished and semi-finished shells. The entire market is featured by higher prices, the upward trend in copper and brass scraps being a special factor. The advance in copper during the past two weeks has been approximately 4 cents per pound, the present range being 17 cents for light, to 21½ cents for heavy and crucible. Brass scraps also show sharp advances, new cuttings are quoted at 13 cents, red brass turnings at 16 cents, yellow brass turnings and medium brass at 10 cents, and light brass at 9 cents per pound.

Galvanizing demand has caused zinc to go higher, an advance of 1 cent placing the present price at 6½ cents per pound.

Advances on iron and steel scraps are likewise general, the range being 30 cents per ton on machine shop turnings, $8 per ton on rails; the quotation on the latter being now $20 per long ton. Other advances will be noted in the selected market quotations.

POINTS IN WEEK'S MARKETING NOTES

Pittsburgh reports an increase in the volume of steel buying. Plate is the only spot where added strength is needed.

—

Some of the U. S. mills are quoting iron rods $5 per ton up. This will affect the wire mills very quickly.

—

The demand for semi-finished steel has been good. In fact some of the mills are out of the market for ingots and billets.

—

Scrap metal prices are strong. No. 1 machinery scrap is very scarce and the offerings for this are likely to go higher.

—

Tin for the first time in some weeks took a rise this week.

—

Copper continues to go up, both for scrap and new metal.

—

Montreal reports a much better feeling in trading, and buying well distributed over a large number of industries.

—

"The best week this year," is the way one machinery dealer sized up the trading of the past few days.

—

Many of the U. S. machine-tool makers are insisting that selling prices now shall be the price at time of delivery of the machine.

MUCH BETTER TONE IN MARKET

Dealers Report Selling as Improving—Metals Are Stronger and May Go Higher.

TORONTO.—For midsummer weather there is a good volume of business on record in this district. Buying is becoming more general, while a lot of prospective business and enquiries have been converted into orders during the week just closed.

The practical settlement of the strike in this district, while not having an immediate effect, will be felt before long. There is a danger that in some lines it will not be possible to recover this season as the time for selling and organizing the seasons' work has gone too far past. In other cases it is known that work will be started just as soon as it is possible to get the men working.

Selling Was Brisk

"We have closed the best week's business this year," is the way one manager sized up the situation. In this case the buying was more general than has been the case for some time. The orders did not come from any particular line, but were well distributed. Railroad equipment, automobile shops and other lines were represented in the lot.

There can be no doubt that the machine tool market is rising. This paper has no purpose in saying so apart from recording what has actually taken place. Some dealers announce a general ten per cent. increase. Some of the less wanted lines are not affected. Deliveries on new equipment are none too good, neither are they showing signs of improving. It may be a small exaggeration to say that a situation somewhat similar to the war period is approaching, but there are several ways in which such a claim can be justified. The machine tool builders, in many cases, have no stock on hand. They are working under high costs which are constantly increasing. They cannot promise deliveries, neither can they guarantee prices on delivery.

A representative of CANADIAN MACHINERY saw three letters that came to Toronto this morning from well-known firms in regard to various lines they make. The idea in all was the same, viz.: that they would not guarantee any quotation made after this date. The only thing to do is to give a price on the date of shipment. This applies to many lines. For instance chain blocks are up far above their pre-war figure. One Toronto firm quoted an Ontario motor company on a lot of these in month of June. Since then they have been advised that the price is cancelled. The Toronto firm was to-day trying to hustle the buyer a little in order to see if the old price could not be secured were the order placed at once. Nor was the increase a slight one. Equipment that was quoted at $87 will now be worth around $112. It is worth noting that chain blocks are still far in advance of old prices without any additions being built on the prices. They are coming more into use as labor-saving machinery is put in, and a shortage of labor and a desire on the part of the shops in many cases to make work lighter and more agreeable is leading to the installation of labor-saving devices. In pre-war days chain blocks used to sell at 25 per cent. off the list, while now the quotation is double the list and 25 per cent. on, 250 per cent. more.

The Matter of Exchange

One big Toronto house is using a rubber stamp now, and it reads as follows: "Owing to the increased rate of exchange it is necessary for us to charge, as extra, prevailing rate on all American goods at time of invoicing." The exchange, which is to-day around 4½ per cent., is coming more and more as a factor in trading. There are some instances where it is quite an item in favor of stocks that have been built up here when the rate was at a much lower figure.

Expect Improvement

The machinery trade looks for an improvement with the strike of the machinists in this district practically disposed of. There is one case in particular where the program for the year is going to be proceeded with, although it was

seriously thought the best thing would be to close up for the remainder of the season. However, the management has decided to go ahead and make the line decided on and then turn the sales force loose on the proposition. The opening up of these machine shops is going to make business better not only for the selling of machine tools but for the supply business, which for some weeks past has been lacking in the assistance it usually gets from the wear and tear of the daily grind.

Cutters Are Down

A considerable reduction has been made in the price of Canadian and U.S. high speed cutters. It is hard to state in terms of per cent. just what the cut has amounted to. In fact reckoning up just what did happen is rather a laborious piece of business, but it runs something like this. Previously a 3x2 high speed cutter has bee nselling at list, plus 2½ times the extra, and now the price is list plus one and a half times the extra. Now that sounds simple enough, but it works something like this on the size indicated. The list is $9 and the extra is $5.75, and two-and-a-half times that and you have $14.37; add in the original nine and the price for the Canadian drill is $23.37; for the U.S. product add another forty per cent. of the total, and it comes up to $32.71. The present method of reckoning takes the $9, adds $8.62 and comes to $17.62 for the Canadian product as against a former $23.37. It may be very convenient to keep the price list the same and simply change the extras on or off, as the case may be, but it is certainly not as plain a way of marking goods as sticking a 25c sign on a box of men's socks.

The Canadian National Railways are in the market again for a nice line of material. Their last inquiry is for small tools, mostly carbon drills. The total list calls for about 1,500 of these, while the list is completed by some 50 high speed drills. This is a nice list and the supply men are figuring pretty close on it.

The Scrap Metal Market

The scrap metal market in this district seems to be coming into better days. Certain it was that there was a long period of wandering in the wilderness after the war. Those who have bought right have had a fairly good chance to clean up on the situation, and a stiffening price always has a good tendency on the market. When prices look pointed upward those who have material are more inclined to sell, while those who need shipments are anxious to get into the market and have their requirements covered before another rise takes place. Buying seems to be quite general, although the steel interests are not taking on a great deal yet, their wants probably being well looked after for some time to come.

There has been no further change in the prices, and they stand where they were placed a week ago, but there is no getting away from the fact that there is more business moving. Machinery scrap, No. 1, is scarce, and it looks to be a safe guess that there will be a better price offered for this before long to see if it will have the effect of bringing any there may be into the market. It is not coming out at present quotations. There are a number of shell shops in the country yet that ought to furnish something for this class, although no doubt the hope is entertained that a sale for second hand machinery might be more advantageous. Some transportation concerns that had been holding back their offerings in hopes of better figures let go during the past week, and some good tonnages have been brought in from this source.

Coppers continue strong, and it looks as though the market for scrap metals of this sort might be marked up slightly before very long.

The Non-ferrous Market

There is a good demand in the market for all classes of materials and the trend is upward, finding vent in a higher rating for tin, copper and spelter, although there is a slight reaction in the price of the latter just now. Copper is quoted locally at 27c to-day. Tin, for the first time in some weeks, starts upward, making a 4c advance.

DEMAND IMPROVES FOR STEEL EVEN DURING THE SUMMER MONTHS

Special to CANADIAN MACHINERY.

PITTSBURGH, Pa., July 31.—The American Iron and Steel Institute has just given out the complete statistics of production of steel ingots and castings, rolled iron and steel, etc., in 1918. These statistics put the matter in a somewhat new light, by reason of the divergence between production of ingots and of rolled steel. During the year the trade had the benefit of monthly reports of the steel ingot production, and last April a preliminary statement of the year's total was given, agreeing almost precisely with the final total now given. It turns out, however, that the rolled steel output was a much smaller proportion of the ingot output than usual. This was due, of course, to the heavy cropping of ingots required by shell steel specifications, but so much was said about uses being found for discard steel that one had some reason to suppose that this heavy cropping would not operate to decrease greatly the production of finished rolled steel. If, for instance, one-third of the ingot was cropped, that steel would be lost as regards shell material, but if it was rolled into light rails, or angles for cots, or concrete reinforcing bars, it would constitute rolled steel. The fact, however, is that while in 1912 and 1913 the total output of finished rolled steel was 76 per cent. of the steel ingot production, in 1918 the proportion was only 69 per cent. That difference of 7 per cent. meant, on the 43,051,022 gross tons of ingots produced in 1918, no less than 3,000,000 gross tons of rolled steel, or 250,000 tons a month. This information helps to explain, to an extent, why the director of steel supply found the supply of steel so much below what he wanted, when nearly every month the statistics of ingot production seemed rather favorable.

The production of ingots in 1918 was 1 per cent. under that of 1917, while it was 4 per cent. above that of 1916. Thus the three great war years ran quite closely together. The 1918 production was 42 per cent. greater than the production in 1912 and 1913, years that showed practically the same tonnage, and by far the best tonnage years before the war. The rolled steel output in 1918 was 29,581,778 tons and the rolled iron output 1,573,976 tons. The rolled steel output was only 28 per cent. more than the 1912-13 output, while the rolled iron output actually showed a decrease of 5 per cent. from these pre-war years. The total of the two was 26 per cent. greater in 1918 than in 1912-13, while ingots showed an increase of 42 per cent

The production of sheared plates, ¼ in. and thicker, was 3,445,284 gross tons, or more than 2,000,000 tons increase over the 1913 output. This was due to the pressure for ship plates, and the increase was accomplished only by the building of many new plate mills. Some of the mills, however, were not completed until nearly the end of 1918, and thus the present capacity is much larger even than the heavy output in 1918. Undoubtedly there will be a surplus of plate rolling capacity for many years.

Production of shell steel is not shown in the statistics. The rolled rounds are included with "merchant bars," which showed a gain in 1918 of about 2,500,000 tons over the 1913 output, while the steel for forged shells was included with "rolled forging blooms and billets," which showed an increase of over 1,000,000 tons. As there was no other demand of importance that would swell the production of either merchant bars or forging steel, it may be assumed that the production of shell steel in the United States was somewhere in the neighborhood of 3,500,000 gross tons.

Other lines of rolled steel showed about the same tonnage in 1918 as in 1912 and 1913, except that some showed rather sharp decreases, rails, for instance, falling off about a million tons, to 2,540,892 tons.

Present Production

Production of steel ingots at present may be estimated as being at the rate of about 35,000,000 gross tons a year, which would be 71 or 72 per cent. of capacity, taking capacity at 49,000,000

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1 New 14" x 8' LEBLOND, with taper.
1 New 18" x 6' CISCO, double back gear, quick change gear, compound rest, taper attachment.
1 New 16" x 8' LEBLOND, double back gear, quick change gear.
4 New 19" x 10' LEBLOND, double friction back gear, quick change gear, compound rest.
2 New 18" x 8' LEBLOND, double friction back gear, quick change gear, compound rest.
1 New 18" x 8' BARNES, plain change gear, compound rest.
1 Used 16" x 6' PRATT & WHITNEY, with taper attachment.
1 Used 16" x 6' BLAISDELL, taper attachment.
1 Used 16" x 6' LEBLOND, compound rest plain change gears.
1 Used 16" x 6' C.M.C., double back gear, quick change gear, all rebuilt.
1 Used 16" x 6' McGREGOR-GOURLAY, quick change gear, double back gear, compound rest, draw in attachment and collets.
1 Used 16" x 6' CINCINNATI, double back gear, compound rest.
1 Used 16" x 8' AMERICAN, quick change gear, compound rest.
1 Used 16" x 8' MONARCH, double back gear, compound rest.
1 Used 18" x 8' BARNES, plain change gear, compound rest.
1 Used 18" x 8' CISCO, quick change gear, compound rest.
1 Used 20" x 8' LEBLOND, quick change gear, compound rest.
1 Used 20" x 10' LODGE & SHIPLEY, double back gear, quick change gear.
1 Used 20" x 10' REED-PRENTICE, all geared head, single belt drive.
1 Used 22" x 8' DAVENPORT, double back gear, plain change gear.
1 Used 20" x 10' DAVIS, plain change gear, compound rest.
1 Used 22" x 8' HAMILTON, plain change gear, compound rest.
3 Used 25" x 10' LEBLOND, heavy duty double friction, back gear, quick change gear and compound rest.
3 Used 24" x 10' MILWAUKEE, double back gear, quick change gear, compound rest.
1 Used 24" x 15' BERTRAM, plain change gear, compound rest.
12 Used 26" x 12' C.M.C., double back gear, quick change gear, compound rest.
11 Used 17" x 6' LEBLOND, manufacturing type, factory re-built.

GAP LATHES

1 Used 28" x 44" x 14' BERTRAM, plain and compound rests, power cross feed, 2⅛" hole in spindle.
1 Used 24" x 36" x 10' McKECHNIE-BERTRAM, plain change gears, compound rest.

TURRET LATHES

1 Used 24" DAVIS Chucking Lathe, back gear, quick change gear, power feed to turret and cross slide, oil pan and pump.
1 Used No. 6 BARDONS & OLIVER, power feed to turret, automatic chuck feed, oil pan and taper.
1 Used DRESES universal geared friction head Monitor Lathe, power feed to turret, chasing bar.
1 Used 14" WARNER & SWASEY, plain head, automatic chuck, with or without cut off slide.

SCREW MACHINES

1 New No. 3 STETCHER, 1¼" capacity, geared friction head, automatic chuck.
1 Used 1¼" capacity PRATT & WHITNEY.
1 Used 1¼" capacity, No. 4 BROWN & SHARPE, plain head.
1 Used No. 4 WOODS Tilted Turret, 1½" capacity.
1 Used No. 1 FOSTER, automatic chuck, cut off slide.
1 Used No. 2 FOSTER, plain head, automatic chuck, cut off slide.
1 Used No. 3 FOSTER, plain head, automatic chuck and cut off slide.

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2 D-1 COLBORNE.
1 No. 315 BAKER.

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New No. 2½ LEBLOND, full universal
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New No. 4 LEBLOND, full universal.
New No. 3 FORD-SMITH, full universal.

Used No. 3 BECKER, plain.
Used No. 3 KEMPSMITH, plain.
Used No. 4 LEBLOND, plain.

SHAPERS

1 New 16" KELLY.
1 Used 24" GOULD & EBERHARDT
1 Used 24" GOULD & EBERHARDT, power feed to head.
1 New 20" GOULD & EBERHARDT.
1 New 24" GOULD & EBERHARDT.

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1 Nearly new 30" x 30" x 10' POWELL, two heads.
1 Used 26" x 26" x 8' LONDON, one head, heavy type.
1 Used 24" x 24" x 7' LONDON, one head, heavy pattern.
1 Used 24" x 24" x 6' McGREGOR-GOURLAY, one head, excellent condition.
1 New 24" x 24" x 6' WHITCOMB-BLAISDELL, second belt drive, one head on the rail.

DRILLING MACHINES

1 Used 14" ROCKFORD, gear driven
1 New 20" BARNES, back geared.
1 New 20" BUFFALO, back geared.
1 New 20" CANEDY-OTTO, back geared.
1 New 22" BARNES, sliding head, power feed, back geared.
1 New 26" BARNES, sliding head, power feed, back geared and with tapping attachment.
1 New 34" SUPERIOR, sliding head, power feed.
1 New 34" BARNES, sliding head, power feed.
1 Used 22½" BARNES, back gear, power feed.
1 Used 25" BARNES, back gear, power feed.
1 Used 26" BARNES, back geared, power feed.
1 Used 40" LONDON, heavy duty, power feed, back gear.
1 Used 24" BUFFALO, sliding head, power feed.

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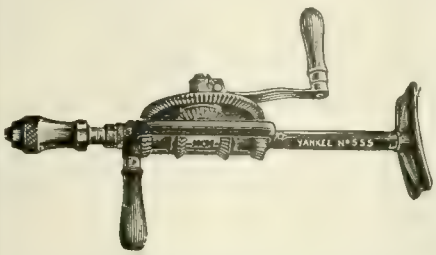

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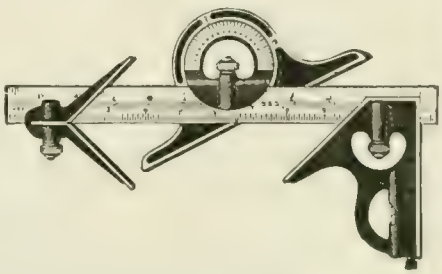
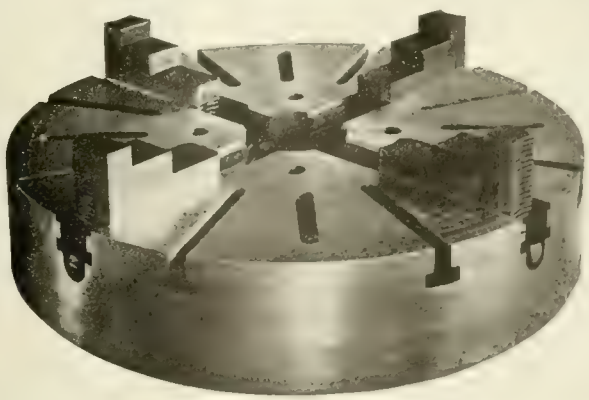


BROWN & SHARPE AND STARRETT MECHANICS' TOOLS

REED VISES

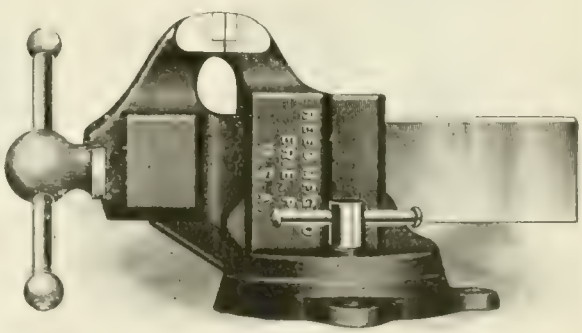
If there is a well known vise—it is the REED Vise, manufactured as it is under rigid inspection it is thoroughly guaranteed against defective or imperfect workmanship, and will unhesitatingly be replaced if it can be returned defective.

These vises are interchangeable and have been standardized by many of the large manufacturing plants. Your safety is in the REED vise.



IMPERIAL CHUCKS

Write Us For Circular And Prices.



REED VISES

Prices and No. 40 Catalog will be cheerfully given on request.

THE A. R. WILLIAMS MACHINERY CO., LTD., TORONTO, ONTARIO

tons. While a 35,000,000 ton rate would show quite a decrease from the 43,051,022 tons actually produced in 1918, the output of finished rolled steel would not show a corresponding discount, for it may be assumed that the proportion of rolled steel to ingots is back to the 76 per cent. recorded in 1912 and 1913, and thus it would be equal to a rate of about 26,500,000 tons at the present time, this comparing with the output of 29,581,778 tons in 1918. The difference is less than last year's output of shell steel, and thus one may say that in all rolled steel outside of shell steel the present production is at a greater rate than the average of 1918.

Steel Demand

Demand is improving somewhat, even in this summer period, usually so dull in the steel trade. Merchant steel bars are mentioned in particular. For some time there has been heavy demand from the cold drawn steel makers, producing shafting and screw stock, and now there is much more widespread demand, the current orders being not much below capacity. Demand for butt weld sizes of pipe continues to improve. As for lap weld, the mills are turning away more business than they accept, being filled up on account of the oil boom.

Export demand is not as heavy as a month ago. The slump in exchange is probably responsible for some of the decline in European buying. Japan and China are still mentioned as being the best buyers. In their case there is no difficulty about exchange, and transportation conditions are particularly good as the Japanese vessels operate under quite favorable conditions. While the export market is somewhat quieter, it is not expected that there will be any material decrease in exports over the average of the past few months, exports having been reported at about 400,000 gross tons a month, in pig iron, billets and finished steel products.

Prices

The balance of probability is that there will be no general advances in steel prices in the near future. All possibility of there being declines is regarded as removed. It is true that a few independent producers have been disposed to advance prices, but such advances when made have not been followed by others. It was July 10 when the Wheeling Steel & Iron Co. advanced butt weld pipe $5 a ton, and lap weld pipe $10, but up to date no other producer has advanced pipe. A fortnight ago the Youngstown Sheet & Tube Co. advanced nails 25c a keg, staples $2 a ton and the extra for coppering wire $5 a ton. A few days afterwards the Cambria Steel Co. made some advances in its wire products, but not the same advances as had been made by the Youngstown Co. Cambria advanced both polished and cemented coated nails 25c a keg, but also advanced plain and barb wire $2 a ton, products which the Youngstown Co. did not advance at all. The Steel Corporation continues to be opposed to the making of any price advances, at least before the end of the year.

MORE FURNACES ARE BEING BLOWN IN TO SUPPLY THE DEMAND FOR IRON

INQUIRIES and sales are brisk, some large orders having been booked during the week. Orders and shipments are generally beyond present production. Following are reports:

Pittsburgh.—Steel makers are coming to the furnaces for bessemer pig iron, and the indications are that the stocks on hand are being worked out. Sales of foundry and basic are limited. The Carnegie Steel Co. has blown in four furnaces during the past week.

Boston.—Sales are generally small, only one lot of any importance having been sold. Enquiry remains good. Total sales for New England for the week are around 7,000 tons. Enquiries for 1920 delivery are meeting with no response from the furnaces.

New York.—Last week's business for foundry iron was in the neighborhood of 25,000 tons, for this year's delivery. The New York Airbrake Co. placed orders for 10,000 tons. Numerous enquiries are out, with the result that the market has developed a strong tone.

Buffalo.—Furnaces are in a position where they are not looking for any business for the balance of the year. Two furnaces are booked up, and the others have only very small capacity left.

Philadelphia.—There is a good enquiry here, and some consumers are asking quotations for 1920 delivery. Furnaces are not keen about selling so far ahead. About 15,000 tons of foundry were sold during the week. Prices are very firm.

Cleveland.—With sales and shipments running ahead of furnace production, furnace stocks are getting low. One dealer sold about 32,000 tons last week, largely foundry, and about 6,000 tons of this were for 1920 delivery. An enquiry for from 50,000 to 75,000 tons basic came out during the week.

Cincinnati. — Southern furnaces are mostly quoting the regular schedule of $28 for this year's shipments. There is not much enquiry, but a buying movement is expected, with an advance in prices before long.

St. Louis.—There is a fair demand for small lots, sales averaging about the same as the past two weeks. Steel makers are not in the market, except for small lots of special grades for mixtures. Most consumers are covered for this year. Furnaces are waiting for higher prices before blowing in idle stacks.

Birmingham.—Stocks are being depleted rapidly in this district, and while sales are not large, prices are firmer. Production is being increased, and three more stacks will be repaired immediately.

Chicago—More stacks are being blown in, and six merchant stacks are now in operation. There has been an increase in the demand for pig iron. Labor troubles are having their effect on sales, as it is felt that were it not for this, some consumers would buy more heavily.

HEAVY MELTING IS IN DEMAND AND SCRAP VALUES ARE GOING UP

Buying is active all over the country and prices are rising accordingly. Following are reports from various centres in the United States:

Chicago.—Prices on all grades of scrap are rising, to the amount of $2 to $3 at a time. Heavy melting steel is expected to reach $25, and rerolling rails $30 per ton before the end of the year. Rolling mill grades are in good demand.

Boston.—Activity in steel making grades is in evidence, and the start of a buying movement has improved the tone of the market. Prices on all grades have advanced. Heavy melting steel has been sold at $20, and turnings have brought $11.

New York.—There is not a very active market, but there is a fair demand for most grades, and prices are holding firm, with a tendency to rise. Heavy melting steel has been sold to Pittsburgh buyers for $20.50 delivered, and is quoted $15.50 to $16 f.o.b. New York.

Philadelphia.—The market here is a little soft, with material in plenty, dealers buying only for shipment. Machine shop turnings and cast iron borings now quoted at $13.50 to $14.50.

Pittsburgh.—With heavy melting steel selling at $21.50, dealers are hoping to see it reach $25. Other steel making grades are active and firm in proportion, but foundry iron is only in small demand. Steel car wheels are quoted at $21.

Buffalo.—All steel making grades are in strong demand, dealers asking $18.50 for heavy melting steel. Mills are offering $18. Low phosphorus is quoted at $22 to $23.

Cleveland.—The market here is strong and active, demand for heavy melting steel, turnings and borings being particularly strong. Prices on all grades have advanced. Heavy melting steel is quoted at $21, with borings $15.50.

Cincinnati.—Steel mill scrap and cast scrap are in good demand, and dealers have advanced quotations on all grades. Considerable steel scrap for this year's delivery has been bought by semi-steel foundries.

St. Louis.—The market here is confined to transactions between dealers, the large consumers having good supplies. The Government are offering about 5,500 tons low phosphorus and shell ingots.

Birmingham. — Domestic market is weak, but an enquiry for heavy melting steel for export aroused considerable interest. Prices are softening, but slightly.

Aikenhead's
TAYLOR PORTABLE STEEL DERRICK

CONSTRUCTED OF MALLEABLE IRON AND STEEL

LIFTING CAPACITY
1,800 lbs.

WEIGHT 197 LBS.

This derrick is tested to hoist 1800 lbs. One man can operate it, but two, or even three men can man the cranks when desirable.

It can be used for hoisting building and roofing material, unloading railroad cars, hoisting ice, stone, marble, machinery, loading waggons, handling baled hay, and for any purpose where the load is required to be hoisted and swung. It swings a complete circle and is equipped with brake to control block.

THREE SPEEDS

ONE MAN	Single Speed Hoists, 300 lbs.	70 ft. per minute	ONE MAN
	Double Speed Hoists, 600 lbs.	35 ft. per minute	
	Triple Speed Hoists, 900 lbs.	25 ft. per minute	

AIKENHEAD HARDWARE LIMITED

17 Temperance Street, Toronto

SELECTED MARKET QUOTATIONS

Being a record of prices current on raw and finished material entering into the manufacture of mechanical and general engineering products.

PIG IRON

Grey forge, Pittsburgh	$27 15
Lake Superior, charcoal, Chicago	34 60
Standard low phos., Philadelphia	
Bessemer, Pittsburgh	29 35
Basic, Valley furnace	25 75
Toronto price:—	
Silicon..2.25% to 2.75%	$32.75 to $35.75

IRON AND STEEL

Per lb. to Large Buyers	Cents
Iron bars, base, Toronto	$ 4 25
Steel bars, base, Toronto	4 25
Steel bars, 2 in. to 4 in. base	5 50
Steel bars, 4 in. and larger base	6 00
Iron bas, base, Montreal	3 75
Steel bars, base, Montreal	3 75
Reinforcing bars, base	4 50
Steel hoops	5 50
Norway iron	11 00
Tire steel	5 50
Spring steel	8 00
Brand steel, No. 10 gauge, base	4 40
Chequered floor plate, 3-16 in.	6 50
Chequered floor plate, ¼ in.	6 25
Staybolt iron	8 00
Bessemer rails, heavy, at mill	
Steel bars, Pittsburgh	2 35
Tank plates, Pittsburgh	2 65
Structural shapes, Pittsburgh	2 45
Steel hoops, Pittsburgh	3 05
F.O.B., Toronto Warehouse	
Small shapes	4 50
F.O.B. Chicago Warehouse	
Steel bars	3 62
Structural shapes	3 72
Plates	3 90
Small shapes under 3"	3 62

FREIGHT RATES

	Per 100 lbs. C.L.	L.C.L.
Pittsburgh to Following Points		
Montreal	33	45
St. John, N.B.	41½	55
Halifax	49	64½
Toronto	27	39
Guelph	27	39
London	27	39
Windsor	27	39
Winnipeg	89½	135

METALS

	Gross.	
Lake copper	$27 00	$27 00
Electro copper	26 00	27 00
Castings, copper	26 00	25 00
Tin	57 00	58 00
Spelter	10 00	10 00
Lead	7 25	7 00
Antimony	10 50	10 50
Aluminum	36 00	35 00

Prices per 100 lbs.

PLATES

	Montreal	Toronto
Plates, ½ up	$ 4 50	$ 4 50
Plates, 3-16 in.	4 90	4 90

Price List No. 38

WROUGHT PIPES

Standard Buttweld

	Per 100 feet	
⅛ in.	$ 6 00	$ 8 00
¼ in.	4 68	6 81
⅜ in.	4 68	6 81
½ in.	6 21	7 78
¾ in.	7 82	9 95
1 in.	11 56	14 71
1¼ in.	15 64	19 90
1½ in.	18 70	23 76
2 in.	25 16	32 01
2½ in.	40 37	51 19
3 in.	52 79	66 94
3½ in.	67 16	84 18
4 in.	79 57	99 74

Standard Lapweld

2 in.	38 81	35 34
2½ in.	42 12	52 36
3 in.	55 08	68 47
3½ in.	69 00	86 94
4 in.	81 75	103 00
4½ in.	93	1 18
5 in.	1 08	1 37
6 in.	1 40	1 78
7 in.	1 83	2 32
8L in.	1 93	2 44
8 in.	2 22	2 81
9 in.	2 66	3 36
10L in.	2 46	3 12
10 in.	3 17	4 02

Terms 2% 30 days, approved credit.

Freight equalized on Chatham, Guelph, Hamilton, London, Montreal, Toronto, Welland.

Prices—Ontario, Quebec and Maritime Provinces.

WROUGHT NIPPLES

4" and under, 60%.

4½" and larger 50%.

4" and under, running thread, 30%.

Standard couplings, 4" and under, 40%, 4½" and larger, 20%.

OLD MATERIAL

Dealers' Buying Prices.

	Per 100 Pounds Montreal	Toronto
Copper, light	$17 00	$13 75
Copper, crucible	21 50	18 00
Copper, heavy	21 50	18 00
Copper wire	21 50	18 00
No. 1 machine composition	18 00	16 75
New brass cuttings	13 00	10 75
Red brass cuttings	16 00	14 75
Yellow brass turnings	10 00	9 00
Light brass	9 00	7 00
Medium brass	10 00	7 75
Scrap zinc	6 50	6 00
Heavy lead	5 00	5 25
Tea lead	4 00	3 50
Aluminum	18 00	18 00
	Per Ton.	Net.
Heavy melting steel	14 00	13 50
Shell turnings	7 00	6 00
Boiler plate	14 00	11 00
Axles (wrought iron)	20 00	20 00
Rails	20 00	13 50
Malleable scrap	16 00	17 00
No. 1 machine cast iron	20 00	18 00
Pipe wrought	11 00	5 00
Car wheels	20 00	20 00
Steel axles	20 00	20 00
Mach. shop turnings	6 00	6 00
Stove plate	15 00	13 00
Cast boring	5 50	8 00

BOLTS, NUTS AND SCREWS

	Per Cent.
Carriage bolts, ⅜" and less	35
Carriage bolts, 7-16 and up	15
Coach and lag screws	50
Stove bolts	65
Wrought washers	50
Elevator bolts	25
Machine bolts, 7-16 and over	40
Machine bolts, ⅜ and less	40
Blank bolts	25
Bolt ends	25
Machine screws, fl. and rd. hd., steel	27½
Machine screws, o. and fil. hd., steel	10
Machine screws, fl. and rd. hd., brass	net
Machine screws, o. and fil. hd., brass	net
Nuts, square blank	add $0 75
Nuts, square, tapped	add 1 00
Nuts, hex., blank	add 1 00
Nuts, hex., tapped	add 1 25
Copper rivets and burrs, list less	15
Burrs only, list plus	25
Iron rivets and burrs	40 and 5
Boiler rivets, base ¾" and larger	$8 50
Structural rivets, as above	8 40
Wood screws, O. & R., bright	75
Wood screws, flat, bright	77½
Wood screws, flat, brass	55
Wood screws, O. & R., brass	55½
Wood screws, flat, bronze	50
Wood screws, O. & R., bronze	47½

MILLED PRODUCTS

(Prices on unbroken packages)

Set screws	50
Sq. and Hex. Head Cap Screws	45
Rd. and Fil. Head Cap Screws	20
Flat But. Hd. Cap Screws	10
Fin. and emi-fin. nuts up to 1 in.	45
Fin. and Semi-fin. nuts, over 1 in., up to 1½ in.	40
Fin. and Semi-fin. nuts over 1½ in., up to 2 in.	25
Studs	30
Taper pins	50
Coupling bolts,	10
Planer head bolts, without fillet, list	10
Planer head bolts, with fillet, list plus 10 and	net
Planer head bolt nuts, same as finished nuts.	
Planer bolt washers	net
Hollow set screws	net
Collar screws	list plus 20, 30
Thumb screws	40
Thumb nuts	75
Patch bolts	add 20
Cold pressed nuts to 1½ in.	add $1 00
Cold pressed nuts over 1½ in.	add 2 00

BILLETS

	Per gross ton
Bessemer billets	$38 50
Open-hearth billets	38 50
O.H. sheet bars	42 00
Forging billets	51 00
Wire rods	52 00

Government prices.
F.O.B. Pittsburgh.

NAILS AND SPIKES

Wire nails	$4 70
Cut nails	4 75
Miscellaneous wire nails	60%
Spikes, ⅜ in. and larger	$7 50
Spikes, ¼ and 5-16 in.	8 00

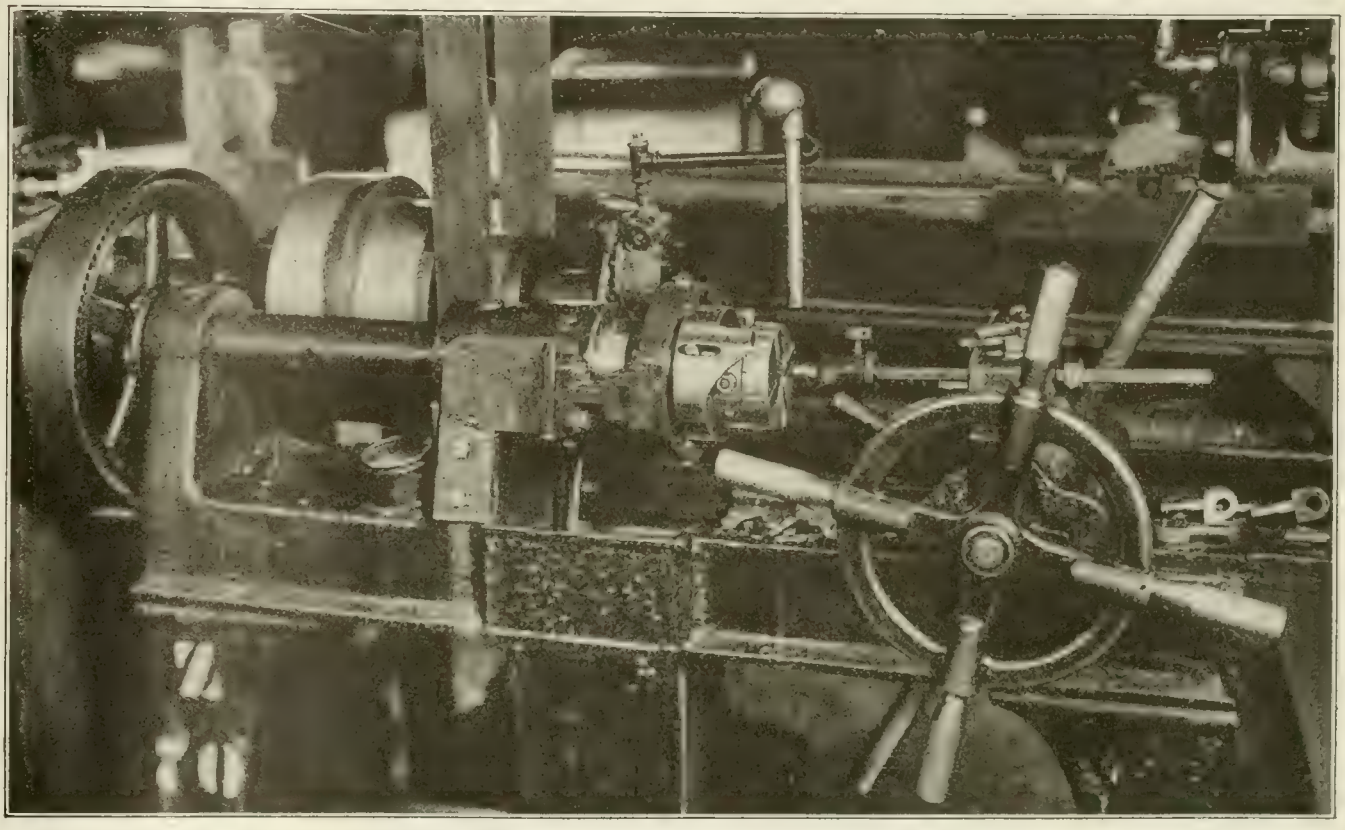
ROPE AND PACKINGS

Drilling cables, Manila	0 39
Plumbers' oakum, per lb.	0 10
Packing, square braided	0 38
Packing, No. 1 Italian	0 44
Packing, No. 2 Italian	0 36
Pure Manila rope	0 37
British Manila rope	0 31
New Zealand hemp	0 31
Transmission rope, Manila	0 43
Cotton rope, ¼-lb. and up	0 74

POLISHED DRILL ROD

Discount off list, Montreal and Toronto	net

BROUGHT UP TO DATE



This old Bolt Cutter has been turned into an up-to-date Threading Machine by the application of a Geometric Die Head.

The Connecticut Telephone Company removed from this Bolt Cutter the solid die head with which it was equipped, and put in its place a Geometric Self-opening Die Head of the type regularly furnished on the Geometric Threading Machine.

Thread is 7-16″ diameter, 14 U.S.S., about 1″ long, on switchboard terminals of a high class copper casting.

The best part of it is, that besides getting clean, sharp threads, they have increased the work about six times over what was being accomplished with a solid die head.

Has any threading operation been given the right chance unless a Geometric figures in it?

The Geometric Tool Company, New Haven, Conn., U.S.A.

CANADIAN AGENTS:

Williams & Wilson, Ltd., Montreal.
The A. R. Williams Machinery Co., Ltd., Toronto, Winnipeg, St. John, N.B.

MISCELLANEOUS

Solder, strictly	$ 0 34
Solder, guaranteed	0 39
Babbitt metals	18 to 70
Soldering coppers, lb.	0 58
Lead wool, per lb.	0 14
Putty, 100-lb. drums	6 75
White lead, pure, cwt.	17 80
Red dry lead, 100-lb. kegs, per cwt.	15 50
Glue, English	0 35
Tarred slater's paper, roll	1 30
Gasoline, per gal., bulk	0 33
Benzine, per gal., bulk	0 32
Pure turpentine, single bbls., gal.	1 10
Linseed oil, raw, single bbls.	1 70
Linseed oil, boiled, single bbls.	1 73
Plaster Paris, per bbl.	4 50
Sandpaper, B. & A.	List plus 43
Emery cloth	List plus 37½
Sal Soda	0 03½
Sulphur, rolls	0 05
Sulphur, commercial	0 04½
Rosin "D," per lb.	0 07
Rosin "G," per lb.	0 08
Borax crystal and granular	0 14
Wood alcohol, per gallon	2 00
Whiting, plain, per 100 lbs.	2 50

CARBON DRILLS AND REAMERS

S.S. drills, wire sies up to 52	40
S.S. drills, wire sizes, No. 53 to 80	40 plus 10
Standard drills, al sizes	40 plus 10
3-fluted drills, plus	10
Jobbers' and letter sizes	40 plus 10
Bit stock	40
Ratchet drills	15
S.S. drills for wood	40
Wood boring brace drills	25
Electricians' bits	30
Sockets	50
Sleeves	50
Taper pin reamers	net
Drills and countersinks	list plus 10
Bridge reamers	50
Centre reamers	10
Chucking reamers	net
Hand reamers	10
High speed drills, list plus	20 to 50
Canadian high speed cutters	net
American	plus 40

COLD ROLLED SHAFTING

At mill	list plus 5%
At warehouse	list plus 25%

Discounts off new list. Warehouse price at Montreal and Toronto

IRON PIPE FITTINGS

Malleable fittings, class A, 20% on list; class B and C, net list. Cast iron fittings, 15% off list. Malleable bushings, 25 and 7½%; cast bushings, 25%; unions, 45%; plugs, 20% off list. Net prices malleable fittings; class B black, 24½c lb.; class C black, 15¾c lb.; galvanized, class B, 34c lb.; class C, 24½c lb. F.O.B. Toronto.

SHEETS

	Montreal	Toronto
Sheets, black, No. 28	$ 6 55	$ 6 00
Sheets, black, No. 10	5 15	5 45
Canada plates, dull, 52 sheets	8 50	7 10
Can. plates, all bright.	8 50	8 00
Apollo brand, 10¾ oz. galvanized	.....	.....
Queen's Head 28 B.W.G.	.....	.....
Fleur-de-Lis, 28 B.W.G.	.....	.....
Gorbal's Best, No. 28	.....	.....
Colborne Crown, No. 28	.....	.....
Premier, No. 28 U.S.	.....	7 50
Premier, 10¾ oz.	.....	7 80
Zinc sheets	20 00	20 00

PROOF COIL CHAIN

B

¼ in., $13.50; 5-16, $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.15; $13.00; ⅞ in., $9.60; ¾ in., $9.70; ⅝ in., $9.95; 1 in., $9.50; Extra for B.B. Chain, $1.20; Extra for B.B.B. Chain, $1.80.

ELECTRIC WELD COIL CHAIN B.B.

⅛ in., $16.75; 3-16 in., $15.40; ¼ in., $14.20; 5-16 in., $11.50; ⅜ in., $10.50; 7-16 in., $9.30; ½ in., $10.50; ⅝ in., $10.00; ¾ in., $9.70.

Prices per 100 lbs.

FILES AND RASPS

	Per Cent.
Globe	50
Vulcan	50
P.H. and Imperial	50
Nicholson	32½
Black Diamond	27½
J. Barton Smith, Eagle	50
McClelland, Globe	50
Delta Files	20
Disston	40
Whitman & Barnes	50
Great Western-American	50
Kearney & Foot, Arcade	50

BOILER TUBES.

Size.	Seamless	Lapwelded
1 in.	$25 00	$.....
1¼ in.	27 00	.....
1½ in.	28 00	26 00
1¾ in.	30 00	26 00
2 in.	30 00	26 00
2¼ in.	33 00	28 00
2½ in.	40 00	32 00
3 in.	46 00	38 00
3¼ in.	.....	45 00
3½ in.	56 00	42 00
4 in.	70 00	54 00

Prices per 100 ft., Montreal and Toronto les 10.

OILS AND COMPOUNDS.

Castor oil, per lb.	
Royalite, per gal., bulk	19½
Palacine	22½
Machine oil, per gal.	27½
Black oil, per gal.	16
Cylinder oil, Capital	52
Cylinder oil, Acme	39½
Standard cutting compound, per lb.	0 06
Lard oil, per gal.	$2 60
Union thread cutting oil, antiseptic	88
Acme cutting oil, antiseptic	37½
Imperial quenching oil	39½
Petroleum fuel oil, bbls. net	10¼

BELTING—No 1 OAK TANNED

Extra heavy, single and double	30%
Standard	30, 10%
Cut leather lacing, No. 1	2 20
Leather in sides	1 75

TAPES

Chesterman Metallic, 50 ft.	$2 00
Lufkin Metallic, 603, 50 ft.	2 00
Admiral Steel Tape, 50 ft.	2 75
Admiral Steel Tape, 100 ft.	4 45
Major Jun. Steel Tape, 50 ft.	3 50
Rival Steel Tape, 50 ft.	2 75
Rival Steel Tape, 100 ft.	4 45
Reliable Jun. Steel Tape, 50 ft.	3 50

PLATING SUPPLIES

Polishing wheels, felt	3 25
Polishing wheels, bull-neck	2 00
Emery in kegs, American	07
Pumice, ground	3½ to 05
Emery glue	28 to 30
Tripoli composition	06 to 09
Crocus composition	08 to 10
Emery composition	08 to 09
Rouge, silver	35 to 50
Rouge, powder	30 to 45

Prices per lb.

ARTIFICIAL CORUNDUM

Grits, 6 to 70 inclusive	.08½
Grits, 80 and finer	.06

BRASS—Warehouse Price

Brass rods, base ½ in. to 1 in. rod	0 34
Brass sheets, 24 gauge and heavier, base	$0 42
Brass tubing, seamless	0 46
Copper tubing, seamless	0 48

WASTE

XXX Extra	19½	Atlas	17
Peerless	19	X Empire	15½
Grand	18	Ideal	16
Superior	18	X Press	14
X L C R	17		

Colored

Lion	15	Popular	12
Standard	13½	Keen	10½
No. 1	13½		

Wool Packing

Arrow	25	Anvil	15
Axle	20	Anchor	11

Washed Wipers

Select White	11	Dark colored	09
Mixed colored	10		

This list subject to trade discount for quantity.

RUBBER BELTING

Standard ... 10% Best grades ... 15%

ANODES

Nickel	.58 to .65
Copper	.38 to .45
Tin	.70 to .70
Zinc	.18 to .18

Prices per lb.

COPPER PRODUCTS.

	Montreal	Toronto
Bars, ½ to 2 in.	$42 50	$43 00
Copper wire, list plus 10		
Plain sheets, 14 oz., 14x60 in.	46 00	44 00
Copper sheet, tinned, 14x60, 14 oz.	48 00	48 00
Copper sheet, planished, 16 oz. base	46 00	45 00
Braziers', in sheets, 6 x 4 base	45 00	44 00

LEAD SHEETS.

	Montreal	Toronto
Sheets, 3 lbs. sq. ft.	$10 25	$11 50
Sheets, 3½ lbs. sq. ft.	10 00	11 00
Sheets, 4 to 6 lbs. sq. ft.	9 75	10 50

Cut sheets, ½c per lb. extra.
Cut sheets to size, 1c per lb. extra.

PLATING CHEMICALS.

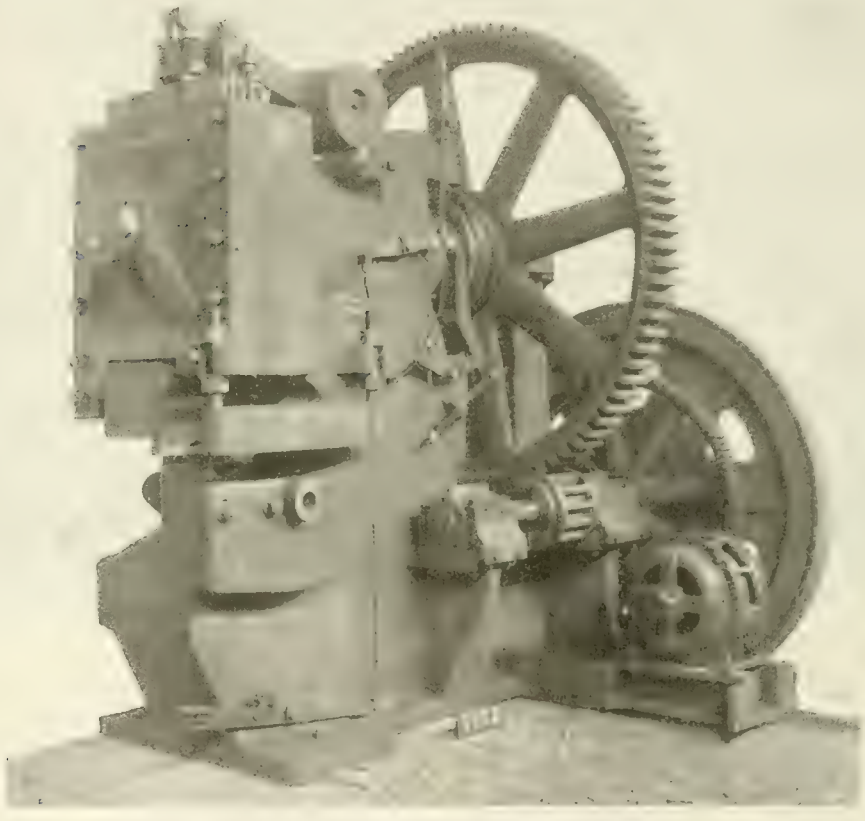
Acid, boracic	$ .25
Acid, hydrochloric	.06
Acid, nitric	.14
Acid, sulphuric	.06
Ammonia, aqua	.23
Ammonium carbonate	---
Ammonium, chloride	.55
Ammonium hydrosulphuret	.30
Ammonium sulphate	.15
Arsenic, white	.27
Copper, carbonate, annhy	.50
Copper, sulphate	.22
Cobalt, sulphate	.20
Iron perchloride	.40
Lead acetate	.35
Nickel ammonium sulphate	.25
Nickel carbonate	.32
Nickel sulphate	.35
Potassium carbonate	1.80
Potassium sulphide (substitute)	2 25
Silver chloride (per oz.)	1.45
Silver nitrate (per oz.)	1.20
Sodium bisulphite	.15
Sodium carbonate crystals	.05
Sodium cyanide, 127-130%	.40
Sodium hydrate	.22
Sodium hyposulphite, per 100 lbs.	6.00
Sodium phosphate	.18
Tin chloride	1.75
Zinc chloride, C.P.	.80
Zinc sulphate	.15

Prices per lb. unless otherwise stated.

"The Quality Line"

PUNCHING and SHEARING MACHINERY

Machinery Equipment for Rolling Mills Bridge and Structural Works



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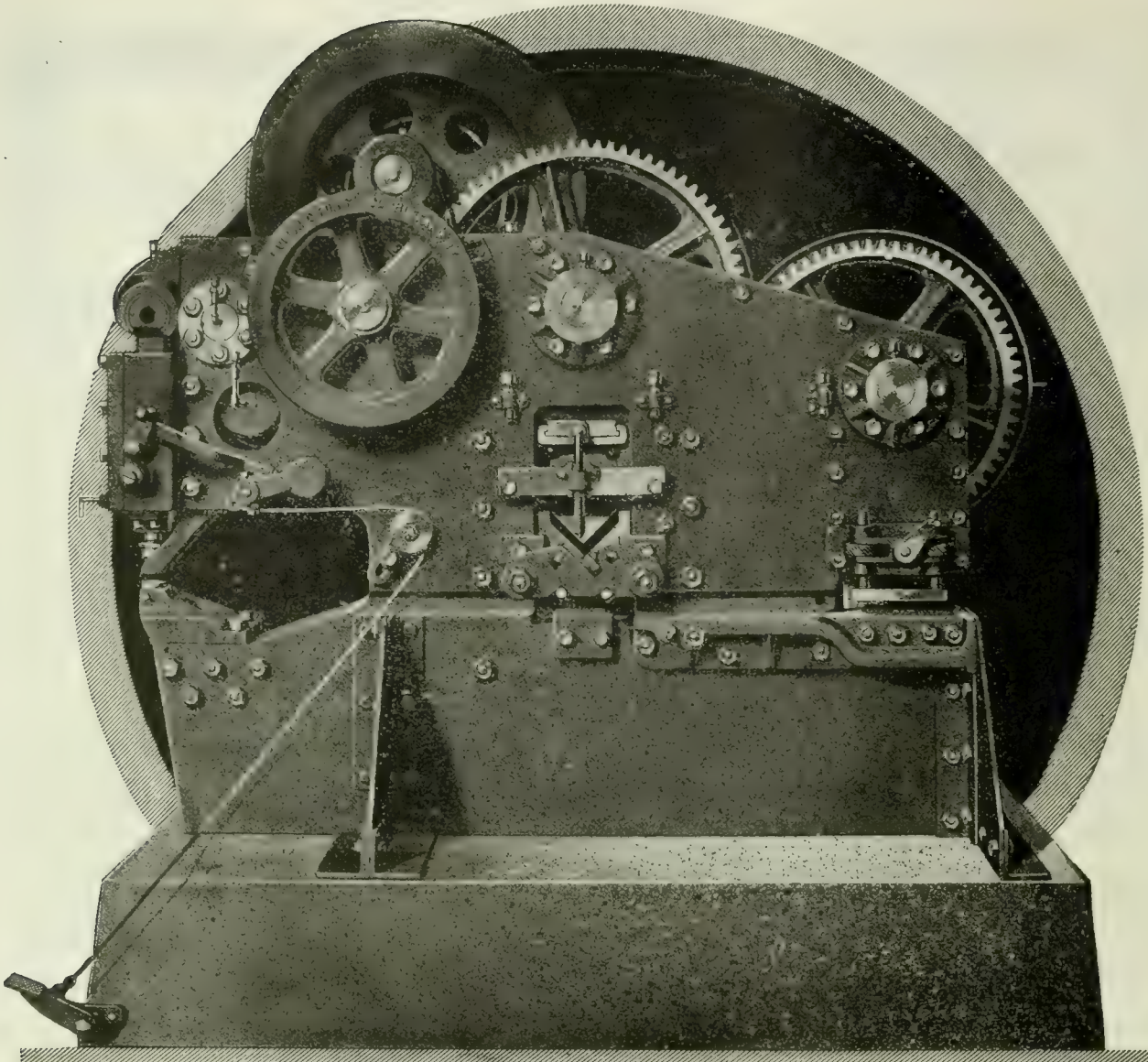

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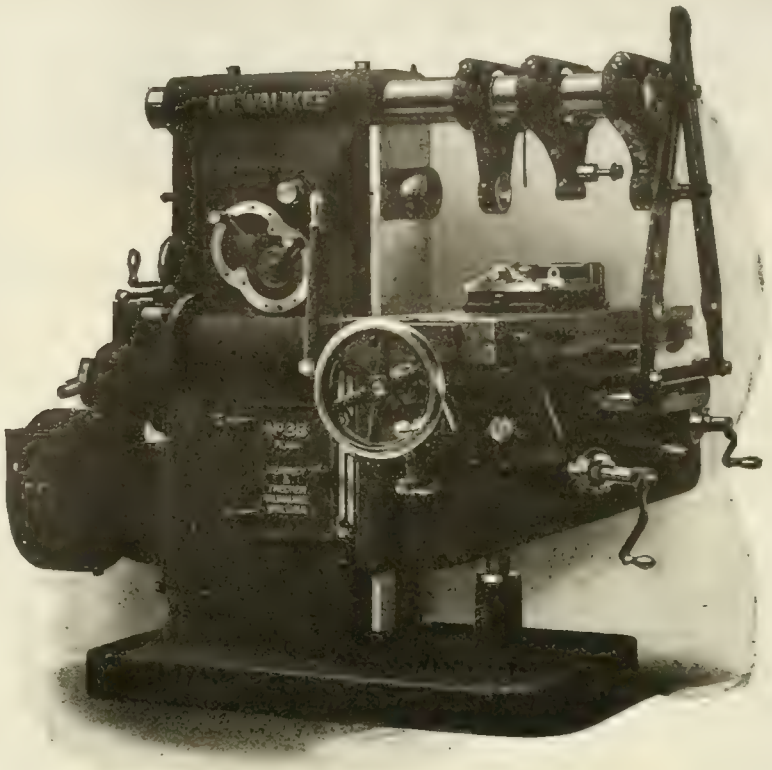

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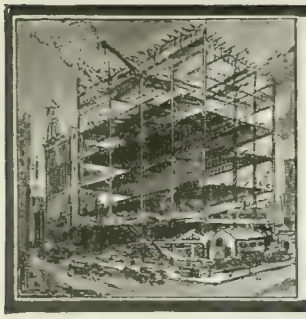

INDUSTRIAL NEWS

NEW SHOPS, TENDERS AND CONTRACTS PERSONAL AND TRADE NOTES

TRADE GOSSIP

To Extend Restrictions. — Premier Lloyd George, in a speech recently, said it was impossible to put into effect the Government's trade policy. He therefore urged that the trade restrictions expiring in September, be extended to a future date.

Newmarket Lets Contract.—The Town Council, at a regular meeting, awarded the contract for a new bridge at Prospect Street to Mr. Lewis of Toronto. The cost of the bridge will be $3,000. A cement bridge to replace the wooden one on Queen Street was discussed, but no decision was reached.

To Relieve Congestion.—The British authorities, in an endeavor to relieve the congestion at the leading shipping ports, are introducing a new rule. All heavy cargoes consigned through ports where congestion is being experienced to destinations that can be more easily served through other ports will be transferred to coastwise steamers at once.

High Prices for Timber Limits.—Some of the Ontario timber land sold recently brought the highest prices ever received, according to the Hon. G. Howard Ferguson, Minister of Lands, Forests and Mines. These lands were situated along the northern shores of the Great Lakes. The highest price obtained was $22.50 per 1,000 feet on the stump, while a number of lots brought $20 per 1,000 feet on the stump.

Take No Ads.—The British Board of Trade desires to state that announcements which have been made in various quarters in the press that advertisements are to be accepted for the "Board of Trade Journal" are entirely without foundation. It was announced in September, 1917, that no advertisements would be accepted after the current contracts had expired, and no change has since been made in the policy of excluding advertisements.

New Cyanide Plant for Canada.—The Cassel Cyanide Company, Ltd., of Glasgow, Scotland, are about to incorporate a Canadian branch of their company. This is on the recommendation of their manager, Mr. Neill, after making one of his periodical tours of Canada and Mexico. He was very favorably impressed with the mineral resources of Northern Ontario and the industrial possibilities of the country generally. The board of the Canadian company will have three members from the Glasgow board, and Mr. Neill will divide his time between the Canadian firm and the parent company.

Foreign Trade Committee.—The Western provinces are anxious to have a foreign trade commission to represent them exclusively, as they believe that to build up western industry a proper investigation of foreign markets is necessary. The idea originated with Mayor Brown, of Medicine Hat, who is president of the Alberta Industrial Association. Mayor Brown sees the possibilities of trade development across the Pacific, and points out that one-seventh of the population of the globe lives along the banks of one river in China.

Double Tracking Railway.—The Canadian Government Railways have let contracts for the double tracking of the track between Halifax and Moncton, and for a section in New Brunswick and one in Quebec. In Nova Scotia the track will be doubled from Truro to Belmont and for long stretches from Maccan and Springhill Junction. A section is to doubled from Moncton towards St. John and at Ste. Rosalie in Quebec. The contractors are the Cook Co., Bate McMahon & Co., and M. J. O'Brien.

International Patent Bureau. — The patents section of the International Research Bureau now sitting at Brussels, have agreed on the establishment of an International Patent Bureau. This would not interfere with the working of any country's patent law, but would work out in this manner: An inventor would take out patents protecting his invention in his own country and then apply to the International Bureau for protection in every other country. This would greatly lower the cost of the desired protection and be an immense advantage to inventors the world over.

Machinery Coming Back.—German industrial firms who had set up stolen Belgian machinery in their own factories are now being compelled to disgorge their ill-gotten plant. About 3,000 tons weekly of this machinery is being shipped back to Belgium, the total tonnage returned on July 1 being 18,000. Regulations for trading with Germany will be issued in Belgium shortly, every transaction being required to be under license. Importation of raw material from Germany will be encouraged, and finished products that do not compete with Belgian manufactures will be allowed.

Useful research.—The research department of Sir W. C. Armstrong-Whitworth & Co., Ltd., have succeeded in producing bronze and aluminum powders, which are so largely used in finishing work on liners and other ships. Before the war the production of these powders was practically a German monopoly. It was only after prolonged experiment and research that the powders were evolved. The powders form bronze and aluminum paints, which are heat resisting, non-corrosive, and giving a beautiful finished appearance. The aluminum powder is also used in steel making. Almost any desired color can be obtained.

Heavy Demand on Lumber Stocks.—Stocks of lumber in Ontario are at a very low ebb, and it is confidently predicted that all stocks will be exhausted by the end of the year. In order to counteract this the cut will be started so much earlier this year. Though the British Columbia mills are again working full swing the demand is greater than the supply. Ontario can use all the lumber she can cut without exporting any, and it is a fact that United States buyers looking for lumber in Ontario have found that Ontario was looking for lumber in the States.

Getting After German Business.—British and French business men have been passing through the Rhine bridgeheads for the past three months, intent upon establishing commercial relations which can be taken advantage of when normal conditions are in force again. The British and French military authorities have given free permit to their business men in passing through, while the American authorities have refused all access to Germany through the bridgeheads controlled by them. This has given the other nations a long pull in getting the German trade.

Enjoying a Boom.—Furniture factories in Canada and the United States are booked up for months to come and with a purely domestic demand. Now the demand for export trade is opening up and manufacturers foresee a still further elevation of prices. Furniture now costs about 50 per cent. more than it did in 1918, and about 100 per cent. more than in 1914. Dealers state that cheap furniture is practically unsaleable, the cheaper kinds of wood not being wanted. Suites that could not have been sold in 1914 are now readily got rid of, and the great trouble is to buy fresh stock to replace them. The only failures that have occurred in the furniture business during the last few months have been in houses handling the cheaper grades.

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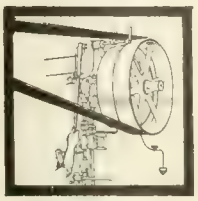
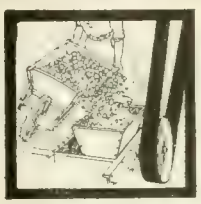
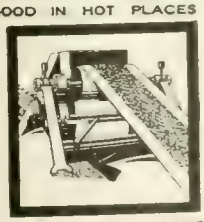

GOOD ON BELT SHIFTERS

GOOD IN OILY PLACES


GOOD IN DUSTY PLACES

GOOD IN HOT PLACES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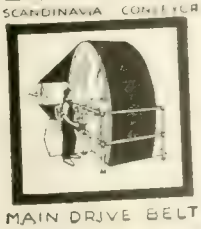
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Opportunities for Export.—Mr. A. C. Mambert, the Ontario Timber Commissioner in London, says there is a good opportunity to export wooden pails, rakes, brooms, washing machines, trays, paint brush handles, etc., from Ontario to France and England. There has been some trade along these lines done, but in a desultory fashion. Before the war Germany had the command of this trade, with Sweden and the United States following. At present importations into England are prohibited from any country outside the Empire, or else are subject to license, which is difficult to secure. There is a great chance right now to get into this trade on a sound basis.

Going to Preston.—Purchase of the Preston Chair Company by the Canada Last Company of Toronto was effected recently. The chair company has been in liquidation, and the town of Preston was obliged to take over its liabilities. The sale of the plant to the Toronto firm will enable the municipality to recover its loss. The Canada Last Company has made its product from blocks, but when the newly-acquired plant is in operation a sawmill will be included in the equipment, and the blocks will be cut from the log. The Council of Preston is congratulating itself on securing a new industry to replace the Preston Chair Company.

The Cost of Coal.—The wild rumors that coal will jump in price as much as $5 to $6 a ton, and a famine develop during the winter, are discounted by Canadian coal dealers, who have been looking into the situation in the States. There will be a shortage, it is thought, and probably a small rise in prices, but nothing like the rise that has been freely prophesied. If people get panicky and all rush to buy coal at the one time there will be a fictitious situation created which will tend to elevate prices. Many of the Italian laborers are returning to Italy, which is creating a shortage of labor, naturally affecting the output. There will be enough coal available to face a normal winter is the consensus of opinion.

Better Wages at Beginning.—Manufacturers who are alarmed at the way young men are taking to the lower or unskilled classes of work because of the better pay to be obtained by a beginner, are considering a way to combat this tendency. Their idea is to pay a beginner at a skilled trade more than he is actually worth in order to encourage him to stick with it and eventually become a skilled mechanic. They believe in this way that they will get permanent men and save the large amount of loss entailed when a skilled man leaves and a new one takes his place. Every man who runs a shop knows that, no matter how good a new man may be, he is a source of expense for the first day or two, or possibly longer, till he becomes habituated to the practice of the new shop.

High Price of Hides.—The prices of hides and leather are now practically sky high, and the supply in the United States and Canada is so low that further advances seem inevitable. Tanners are delivering leather at present at lower prices than they can restock at, and shoes are selling at prices which cannot be repeated on fresh stocks. The only thing that can check this advance would be increased imports. There are large accumulations of hides in Russia, and also in South America, India and China. What is wanted is increased transportation facilities. The stories that all raw material had been cleared out of Russia is evidently false, for a shipment of hides arrived at a Pacific port recently from Russia in excellent condition, nothwithstanding the fact that the hides were over four years old.

The Alien Getting Even.—The many aliens of supposedly Austrian nationality, but really Slavs and Croats, who have been working in the anthracite mines, are getting out of the country as fast as they can. Forty-two thousand have already gone, and as fast as steamer space becomes available, more are going. These men, who were far from being in sympathy with Austria during the war, resented the attitude displayed by many Canadians to them, and as a result of their being so anxious to get back to their own countries, there is a grave danger of many of the people who vilified them being cold this winter. The production from the mines, where central Canada gets her anthracite coal was, up till the end of June, only 38,000,000 tons, ten millions less than for the corresponding period of 1918.

The Coal Situation in B. C.—Sir Robert Borden sent a telegram to the mayor of Sydney Mines, which was read at a labor meeting recently. The Premier stated that the Canadian National Railways were taking more coal from Nova Scotia this year that last, and had divided their orders between sixteen different mines. He pointed out the handicap that Nova Scotia was under owing to the shortage of ship tonnage. He stated that the Canadian National now had a stock of coal on hand good for seventeen weeks and were adding to their stock daily. Mr. R. H. Butts denounced the leaders of the United Mine Workers locally as demagogues and agitators. Mr. McLachlan, addressing the meeting, was not disposed to accept the Premier's explanation and thought that much of the present unrest was due to the Government's attitude towards labor. He thought that United States coal should be shut out of Canada altogether.

Strike Ends.—About sixty shops in Toronto have resumed operations when the machinists, on strike for twelve weeks, returned. Following a conference between the employers and representatives of the men, the latter at a meeting accepted the terms offered with little comment, and were instructed to report for work at once. About 1,200 men started the following day. While it may be several days before all of these men are placed owing to the disorganized state of the shops following the strike, they will all be looked after. While the strike is generally admitted to be a failure in so far as the strikers did not receive the 44-hour week and 50-hour pay demanded, it is pointed out by union officials that these conditions, as well as the extra wages, have been conceded by twenty-three shops in the city at which the men have been working for some time past. The question of wages with the 56 shops will be settled at another conference between the union officials, the Strike Committee, and the manufacturers. One of the union officials stated that the loss in wages to the men might be figured as something well over a million, while the International paid out $560,000 in strike pay.

Increase in Express Rates.—The application of the Express Companies for an increase in rates has been dealt with in an exhaustive report from the Board of Railway Commissioners, occuping 93 pages of printed matter. The judgment admits that the companies are carrying on business at a loss, and in order to increase receipts, increases are allowed in the general merchandise list. There is no increase allowed in essential commodities, the Board considering that such an increase, however small, would afford a reason for a further increase of price in these commodities to the consumer. The Board feels that such a change is undesirable in the interests of the consumers and the express companies themselves. The increases allowed in the general merchandise scale amount as a whole to 45.94% on Eastern Canada, 23.75% on the prairies, and 1148% in British Columbia. The effect on the three different sections of the country will be as follows. The prairie rates 39.55% higher than Eastern Canada, will be under the new schedule only 17.88 per cent. higher, and British Columbia now 29.29% higher than the prairie rate, will be now only 15.01% more. The wagon service is materially increased in the cities, thus giving relief to those districts that have not formerly had an adequate service.

Cost of Pavement.—"That it is costing the city forty per cent. more to pave streets by giving the work to contractors than by the city undertaking the work," was the statement made by a member of the Chatham council. The alderman stated that in reply to an enquiry as to the cost of grading, paving and curbing at Gray and Lorne Avenue, made at the council, is proof of his statement. "It was shown by the figures that the cost of the work of putting down Gray Street pavement, not including material, is 16½c per square yard, and the cost of curbing was 15c per lineal foot," said the Alderman. "Adding overhead charges, which would not exceed more than 10c per square yard, it will readily be seen by these figures that the cost of laying pavements by city workmen, and under the city engineer, is about forty per cent. less than by contract, when we consider that on certain streets contracts have been awarded at one dol-

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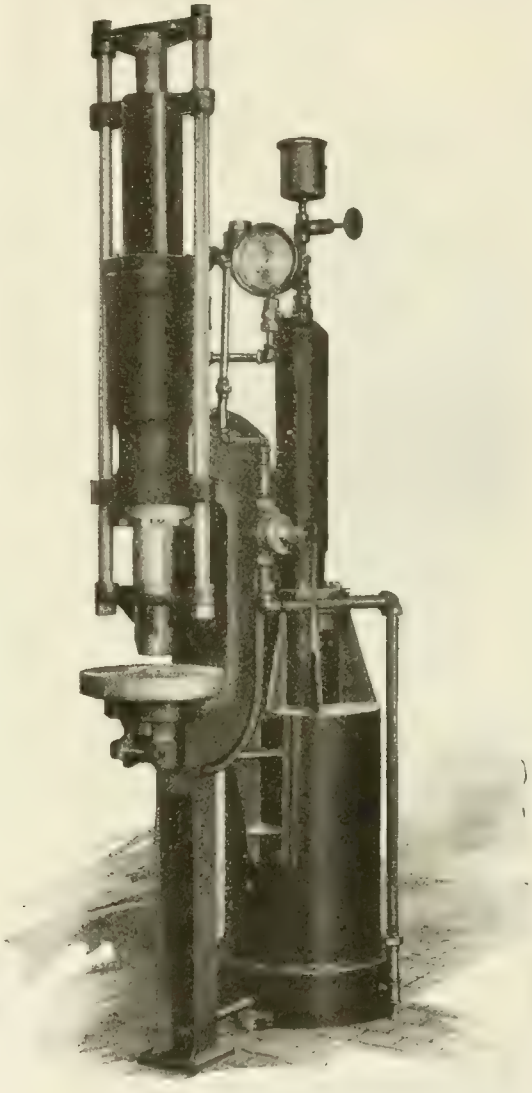

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Building at Kitchener. — Construction of a plant for the assembling of motor truck parts and for the manufacture of truck bodies will be proceeded with almost immediately in Kitchener, according to an announcement by an official of the F. W. D. Auto Company, which will operate as the Canadian end of the parent organization in the United States, The decision to erect a plant in Kitchener was arrived at some time ago, and a site was purchased in the eastern section of that municipality. Difficulties arose in connection with the new location of the Grand Valley Railway, and it was found advisable to postpone the work of construction until the railway plans were completed. These details have been worked out finally, and there are no further obstacles to the immediate erection of the plant. Trucks have been shipped in from the United States plant meanwhile to fill Canadian orders. One of the considerations that governed the truck company in seeking to establish a plant in the Dominion was that the British preference on motor cars will make it advantageous to ship Canadian rather than American trucks. The markets of the Empire look attractive to this firm The United Kingdom is regarded as a promising field. Australia, New Zealand, India and South Africa, and all other sections of the British Empire where railway transportation is not highly developed, are looked upon as potential markets for large numbers of trucks. Production will be commenced at the Ontario plant before the end of the present season.

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INCORPORATIONS

The Galt Brass Company, Limited, has been incorporated with an authorized capital of $500,000 to take over the liabilities and carry on the business of the Galt Brass Company Limited, Galt. They expect to develop and expand the business considerably. The old company was incorporated under a provincial charter, while the new concern has obtained a Dominion charter.

MARINE

Cleveland.—The death is announced of Capt. Charles A. Benham, master of the steamer John Stanton, of the Hutchinson fleet. He was only 51 years of age, and was in active service up to a week from his death. He is survived by his father, Captain C. E. Benham, and four brothers, besides a widow and two sons.

Paris.—The French Minister of Public Works, M. Albert Claveille, announced in the Senate that he would shortly submit a plan whereby France's mercantile tonnage would be increased to more than double the pre-war tonnage in the next three years. The aim of the Government would be to build 5,000,000 tons in French yards.

Hamilton.—A big appropriation having been made by the Dominion Government early in the year for work on the harbor, the Board of Harbor Commissioners are anxious to get it started. To this end Mr. T. J. Stewart, M.P., at-

tended the meeting and promised to use his good offices to get the work started as early as possible.

Rotterdam.—The N. Y. Wiltons machine factory, Scheepvart, has acquired a plot of land between Vlaardingen and Schiedam, for the purpose of building a huge dockyard. The dockyard will be used for building ships, which will be built in the dock instead of on slips. To begin with only one dock will be built, in which two ships about 650 feet long, and eight small ships, about 328 feet long, can be constructed at once. If the venture proves successful a similar dock for the construction of vessels as big as the Vaterland will be built, as well as a floating dock to take vessels of 40,000 tons. The dockyard, when completed, will be the largest in Europe.

NEW BOOK ON ABRASIVES

Abrasives and Abrasive Wheels
By Fred B. Jacobs

Three hundred and thirty eight 5 in. by 8½ in. pages, bound in dark red cloth boards. Published by the Norman W. Henley Publishing Co., 2 West 45th Street, New York, U.S. Price $3. This book is a complete treatise on the manufacture and practical use of abrasives, abrasive wheels, and grinding operations.

The natural and artificial abrasives are discussed fully, also the production and preparation of the same. Grits, grades and bonds, sharpening and grinding stones and wheels, testing wheels for efficiency, trueing, rebushing and installing wheels, safety devices, and dust-collecting systems, complete exposition on surface, external and internal grinding, and comprehensive data covering the physical and chemical nature of abrasives in general are fully explained and illustrated.

A condensed list of contents follows: Natural abrasive substances, artificial abrasives, the manufacture of grinding wheels, artificial sharpening stones, grits and grades, testing wheels for efficiency, laboratory tests, grinding wheel vs. grindstones, the economic advantage of using large wheels, trueing devices for grinding wheels, suggestions to follow in ordering grinding wheels, design of dust-collecting systems, safeguarding grinding wheels, abrasive papers and cloth, surface grinding, cylindrical grinding, internal grinding, special grinding operations, cutter sharpening and saw sharpening. This book is profusely illustrated throughout.

From this it will be noticed that the field is well covered, and a book such as this makes an ideal handbook for engineers, factory superintendents, foundrymen, shop foremen, and mechanics in general.

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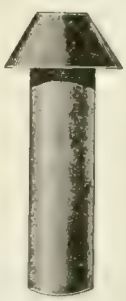

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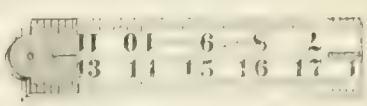

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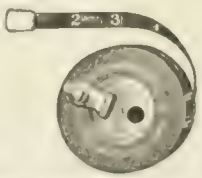

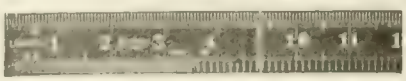

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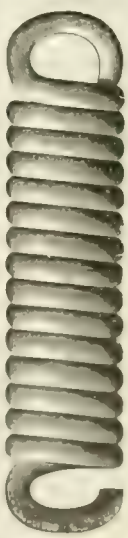

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Tenders will be received by the undersigned Commissioners up till 2 o'clock p.m. Saturday, the 26th day of July, 1919, for the repair to the 3-4 Sideroad and 8-9 Concession drain, in the Township of Brooke, County of Lambton. Estimate cost of excavation, $9,600. Contractors must furnish security for the completion of the work. Plans and specifications may be seen at the office of the Clerk, Lot 16, Con. 9, Brooke Township. Lowest or any tender not necessarily accepted.

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C6M

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2 and 3 Phase—25 Cycles.

Generator. K.W.	Volts.	R.P.M.	Engine. Cylinder Dimensions.
250	220	214	15 x 22 x 17″
260	220	214	15 x 17″
450	550	125	17 x 34 x 30″
1000	240	107	24 x 48 x 42″

2 and 3 Phase—60 Cycles.

Generator. K.W.	Volts.	R.P.M.	Engine. Cylinder Dimensions.
25	440	1200	8 x 8″
50	2200	300	11 x 19 x 11″
50	2300	300	11 x 12″
100½	240	277	14 x 14″
125	220	225	14½ x 18″
125	240	200	12 x 21″
150	220	225	10 x 20 x 18″
150	2300	225	14 x 22 x 16″
200	2300	200	
300	480	150	14 x 28 x 30″
300	2300	150	18 x 30 x 22″
325	2300	120	24 x 36″
325	2300	150	18 x 36 x 24″
400	600	150	24″
450	2300	100	22 x 42 x 48″
450	550		24 x 36 x 36″
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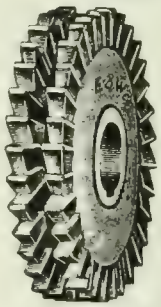

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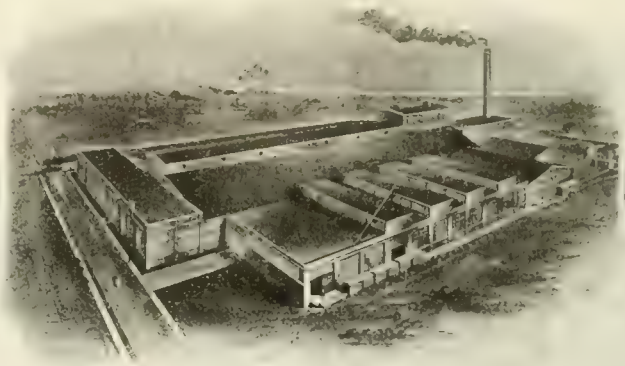

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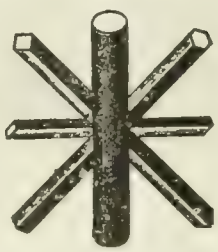

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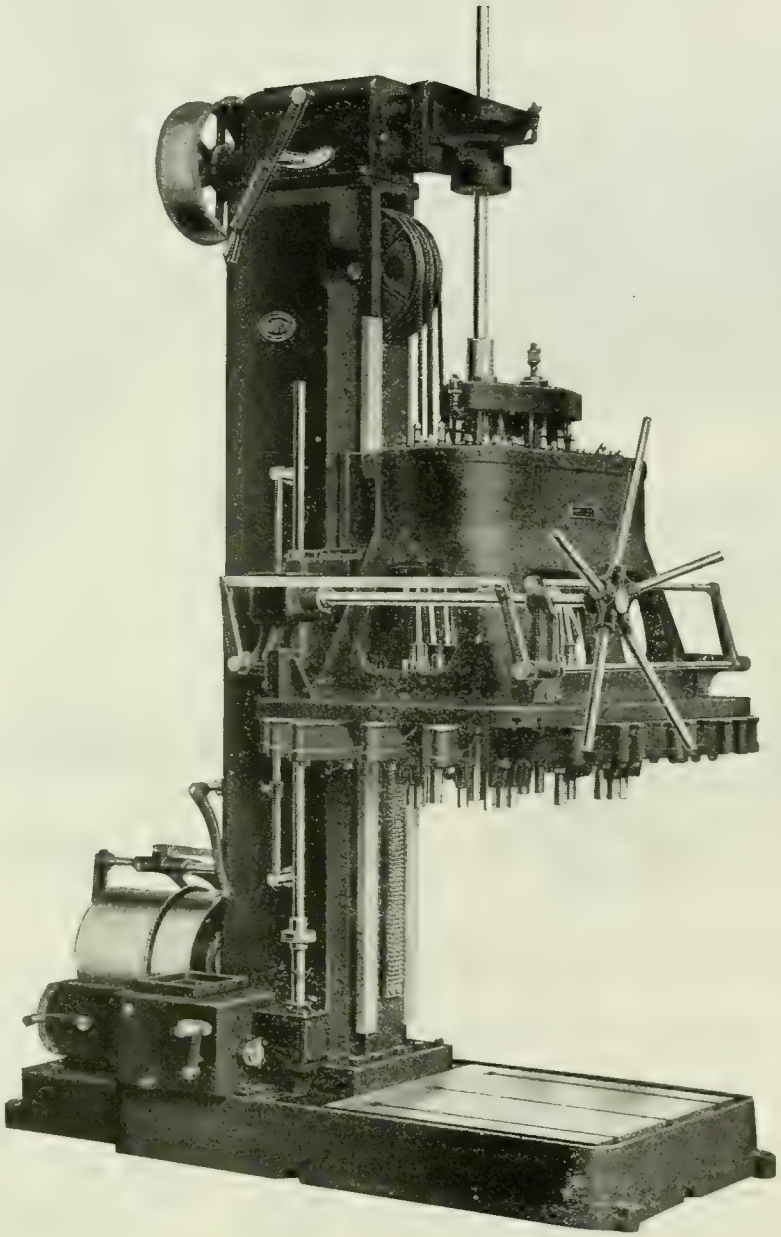

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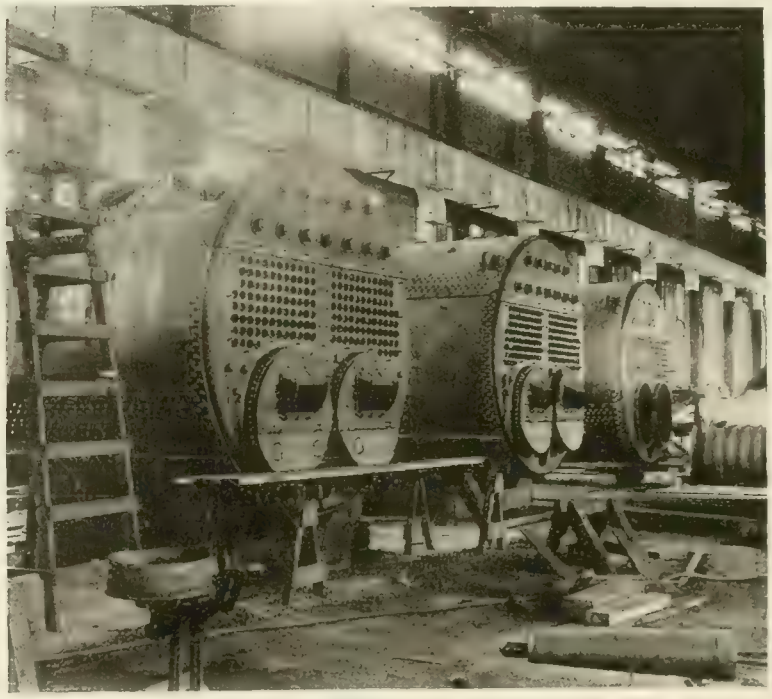

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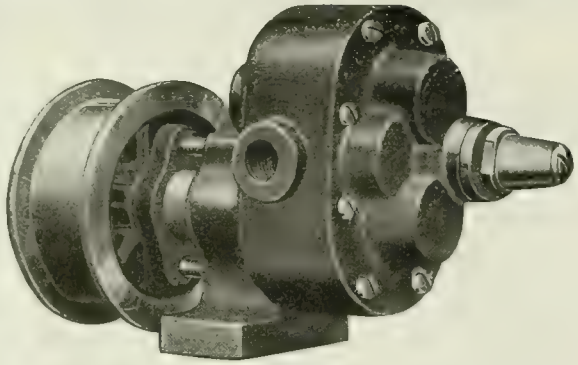

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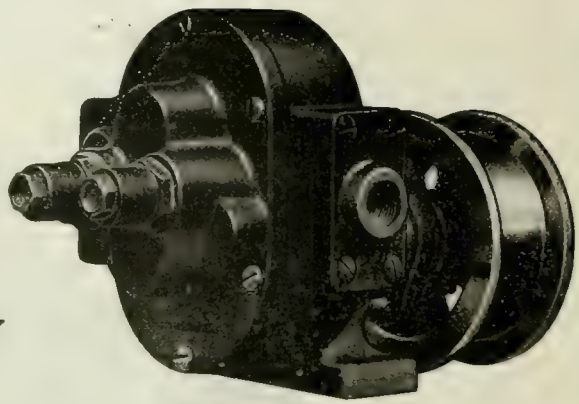

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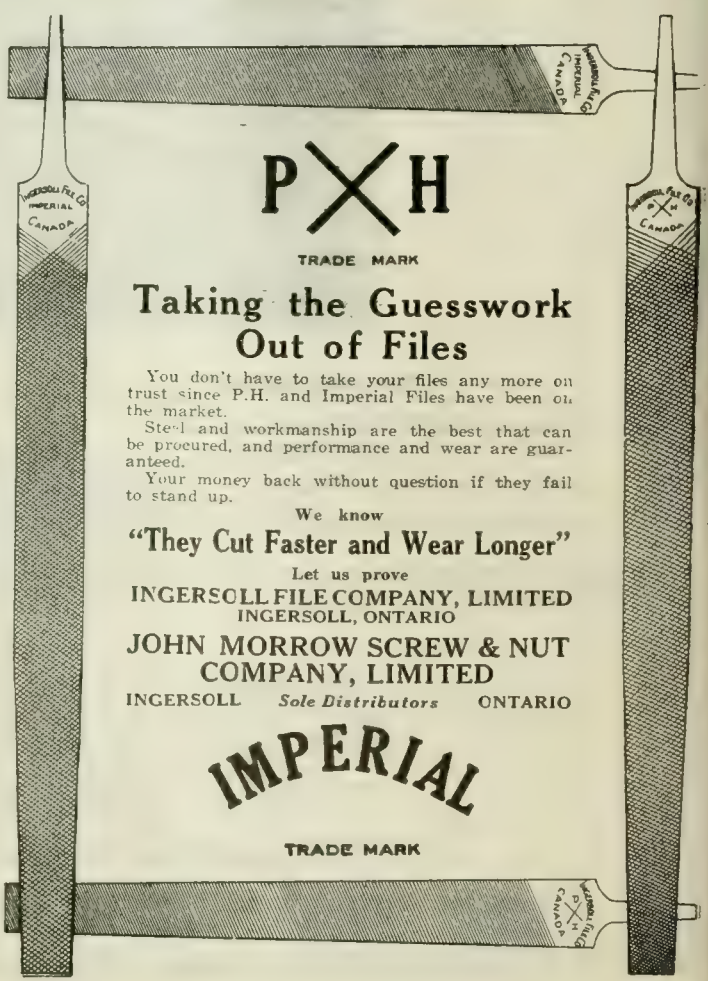

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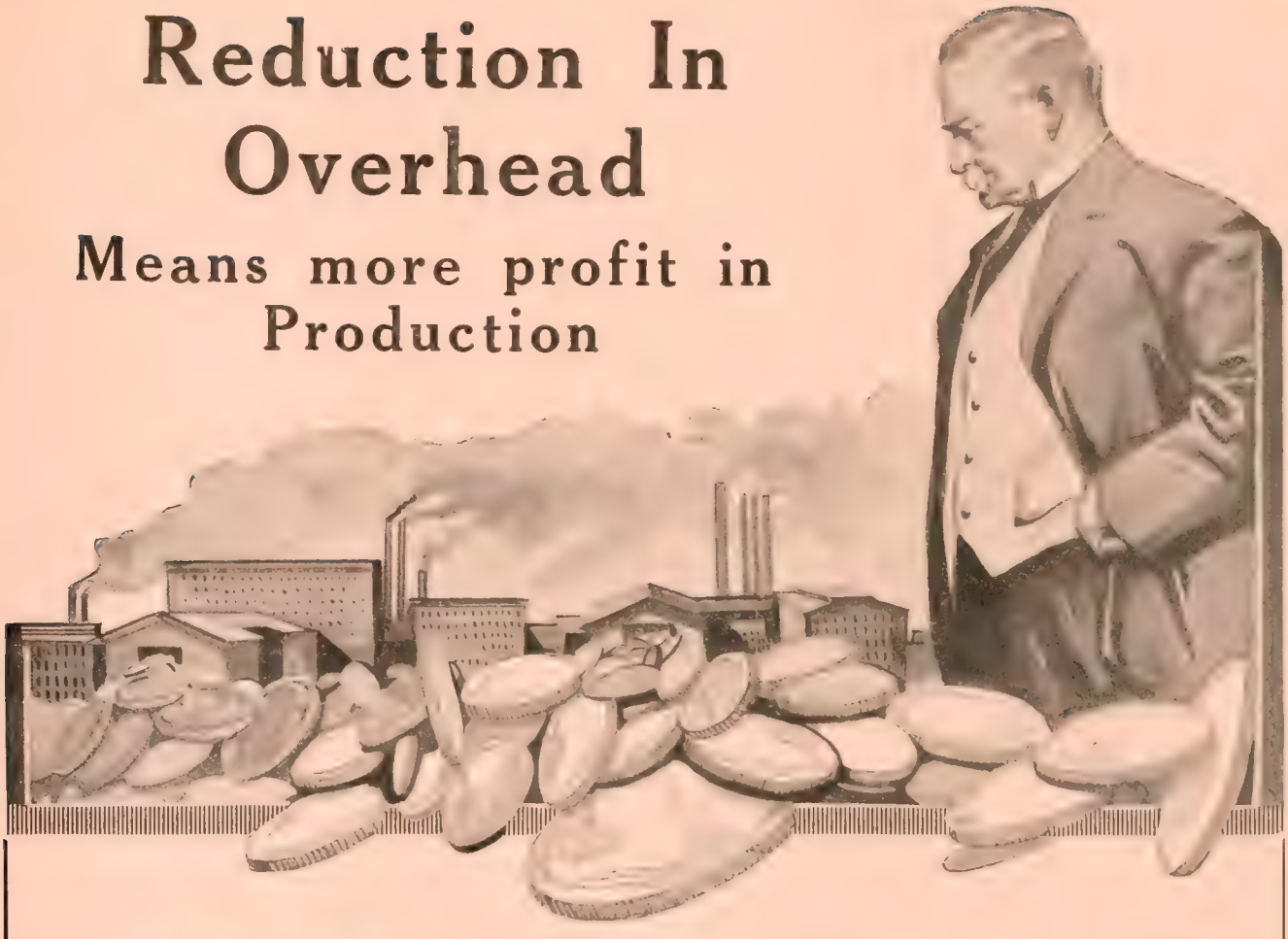

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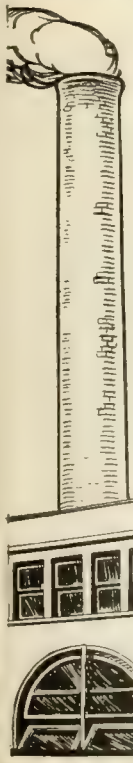

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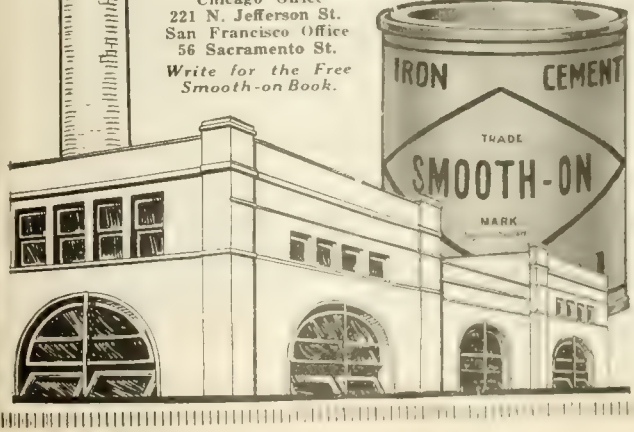

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We will Give You Satisfaction on all Work of this Kind.

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Will give you a short cut to lower-cost thread milling.
Study the blue print and time study as given below.

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THREAD—1½ in. diameter, 2 1-16 length, 6 pitch U.S. standard.
PIECE MILLED—Axle for tractor.
MILLING FEED—4.35 per minute.
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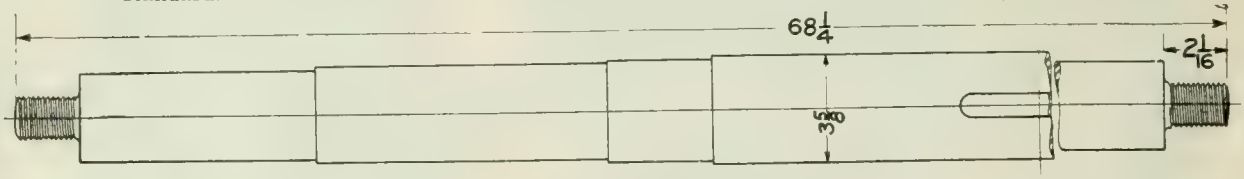

Tractor Axle Operation
TIME STUDY

5 minutes 37 seconds floor to floor milling both threads. Each thread milled in 65 seconds. Balance of time handling. Barker 3-jaw chuck used which had 12 in. unsupported overhang turn main spindle bearing to thread.

NOTE.—These parts were chucked through the rear end of main spindle. This was an awkward operation because the pieces were larger in the center and the type of chuck would not let them through. A collet chuck with false collets would have permitted faster chucking.

Consult us on every phase of Thread Milling. We will show you how to cut the costs.

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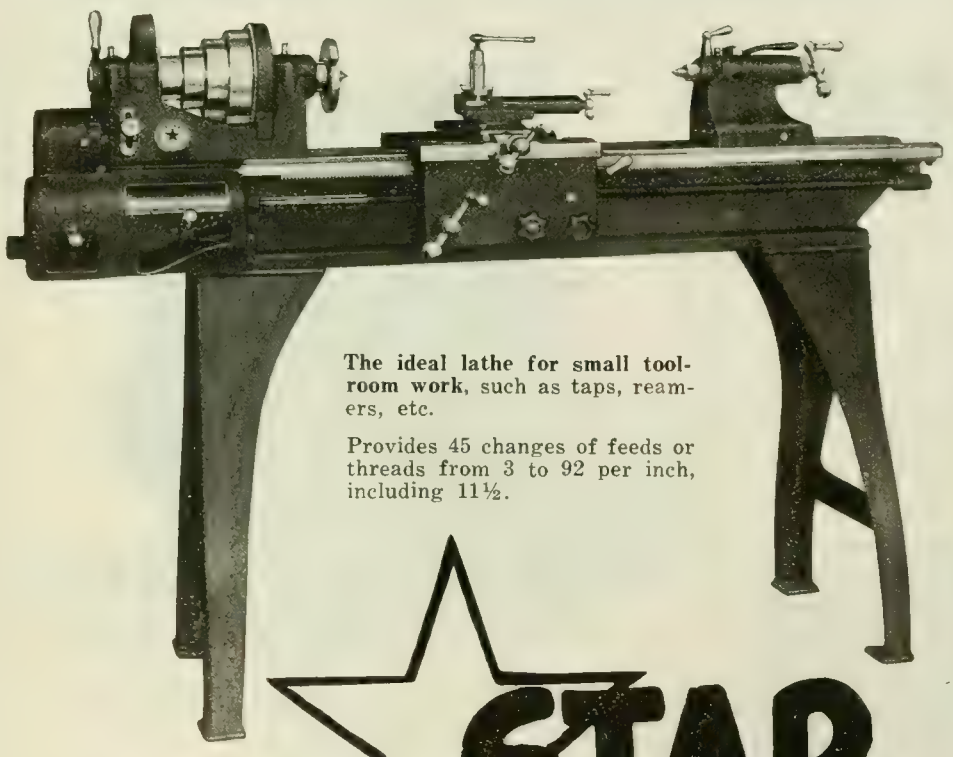

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Provides 45 changes of feeds or threads from 3 to 92 per inch, including 11½.

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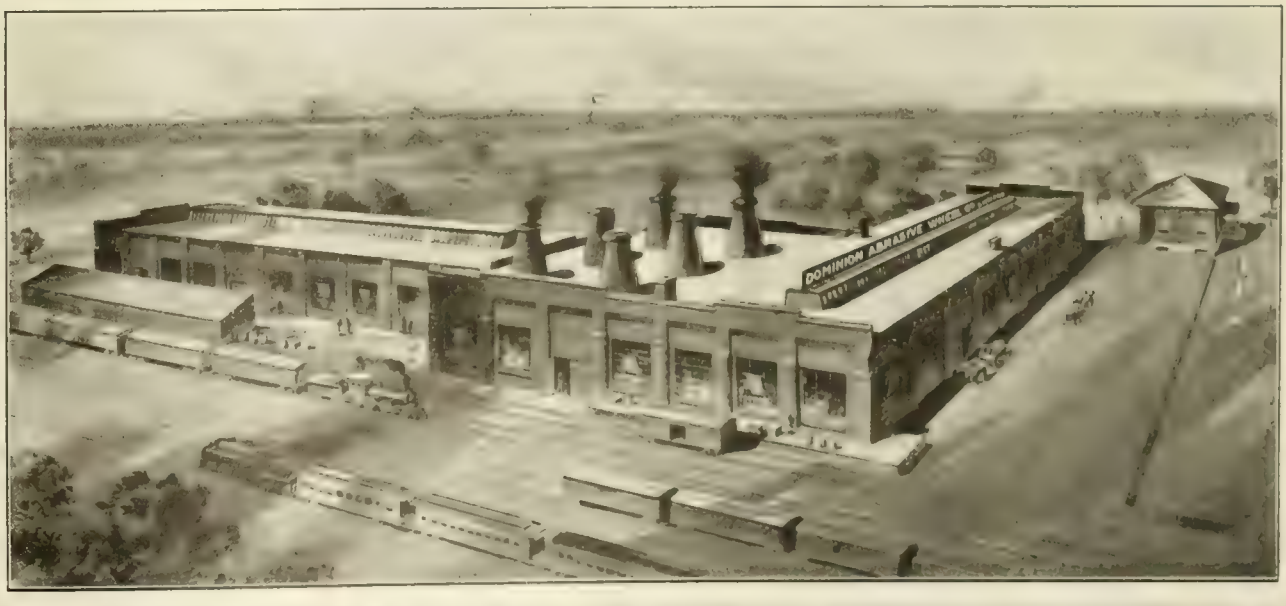

The Secret of the Strikes

Most Canadians are asking "What is the cause of the 'Great Unrest' "? Is it the fault of labor—or of capital?—or is it the result of German propaganda? Do you know of the real reason for the labor disturbances in Canada, and elsewhere? Are YOU thoroughly familiar with the ins-and-outs of the plans which threaten a world-wide "tie-up?" This is something that should be understood by every Canadian. And every Canadian should read "The Secret of the Strikes," by Lieut.-Colonel J. B. Maclean in the August issue of MacLean's Magazine. It is brimful of startling and authoritative information regarding this great problem. Read it carefully. It starts on page 33, August MacLean's.

"The Lecturer At Large"

Stephen Leacock is one of the continent's greatest humorists. "The Lecturer at Large" is one of the best humorous sketches that he has written. It is made up of what he terms "a few painful reminiscences of the platform" in the course of his lecturing up and down Canada. Get your family around you and read the sketch aloud—it's a rare treat.

Other Big Features

"A Party in the Making." By J. K. Munro. Illustrated by William Casey. An article on the political situation, giving a great deal of inside information with reference to recent developments at Ottawa.

"Solving the Problem of the Arctic." By Vilhjalmur Stefansson. The fifth instalment of his story of the five years' explorations that he conducted for the Dominion of Canada.

"The Unspoiled Country." By Harold C. Lowrey. A descriptive article of a part of Canada which is little known to Canadians generally, Temagami.

"Petite Simunde." By Arthur Beverley Baxter. Illustrated by E. J. Dinsmore. A charming romance of the war. The author will be remembered favorably for his "Mr. Craighouse of New York, Satirist."

"The Seven Blue Doves." By W. A. Fraser. Illustrated by Charles L. Wrenn. The fifth of the Bulldog Carney series and in some respects the best. It is a mystery story.

"His Majesty's Well-Beloved." By Baroness Orczy. Illustrated by C. F. Peters. The second instalment of this splendid romantic novel of the colorful era of Charles II.

The Month's Vital Question

Turn to page 34, August MACLEAN'S, and you will find timely and interesting information regarding the High Cost of Living—a problem of large proportions.

The Review of Reviews

Here are a few of the articles chosen as the best published during the past month in all magazines:—Britain Winning Supremacy of the Air; Has Japan Two Governments?; Kaiser Employed Famous Beauties; The New Triple Alliance; Mammoth Animals in Alberta.

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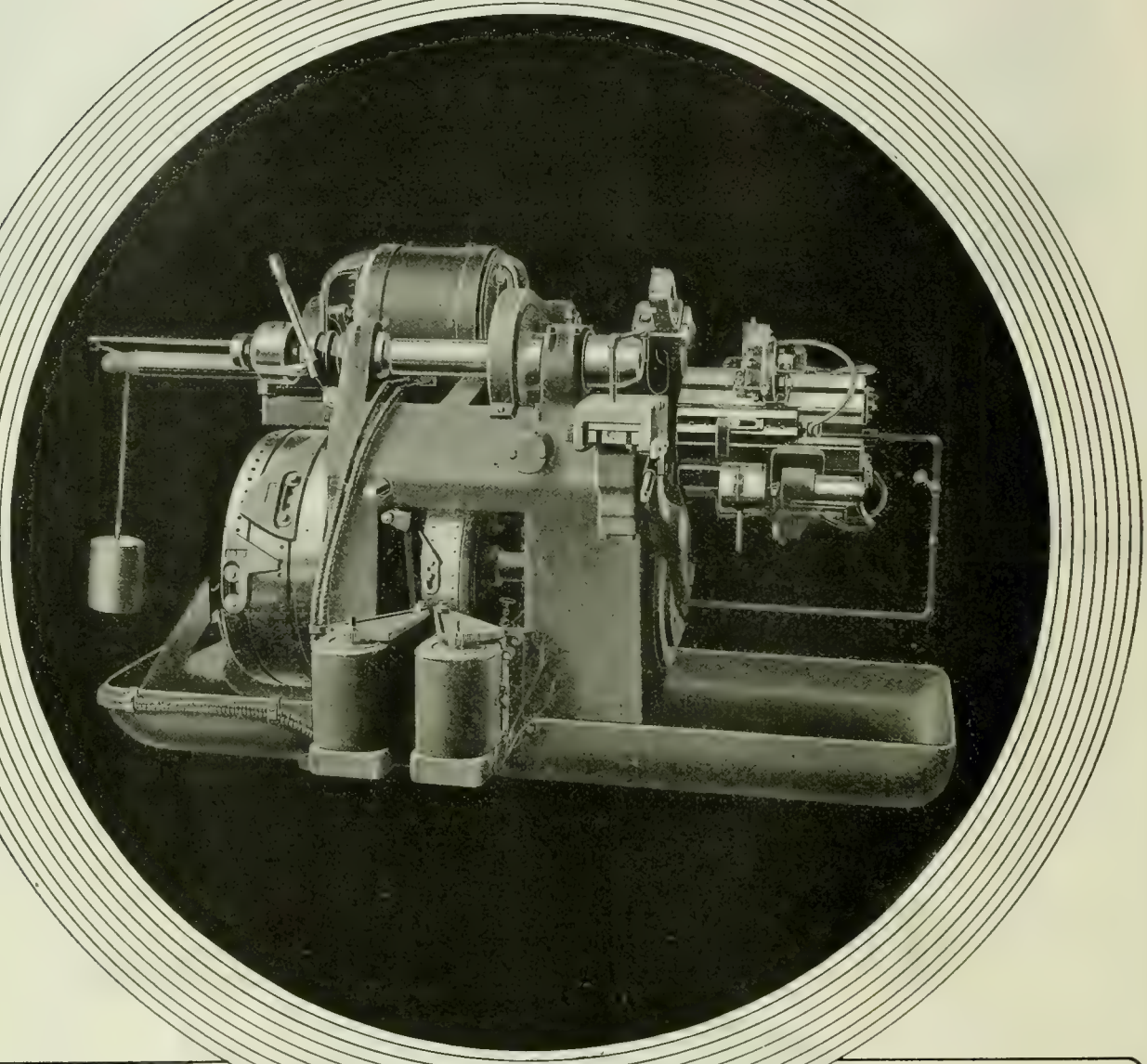

Let's be specific:

A comparison of two different Turret Lathe jobs for accuracy or for output, merely on heresay or opinion has often resulted in a new attitude when the real figures were known.

Gridley Automatic Turret Lathes stand or fall by their specific performance on *your* work in your shop. May we quote you *specifically?*

Capacities 2¼-5".

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AUTOMATIC SCREW MACHINERY AND ITS PRODUCT

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Built in a Plant that has been specializing in high-grade, dependable Saw Mill, Pulp Mill, and Hydraulic Turbine Machinery for over sixty years.

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Lath Mill Machinery
Shingle Mill Machinery
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Hogs
Drag Saws
Gang Circulars
Twin Circulars
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Refuse Burners
Conveyors
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Boilers
Feed Water Heaters

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Pulp Wood Slashers
Pulp Wood Conveyors
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Pulp Grinders
Centrifugal Pumps
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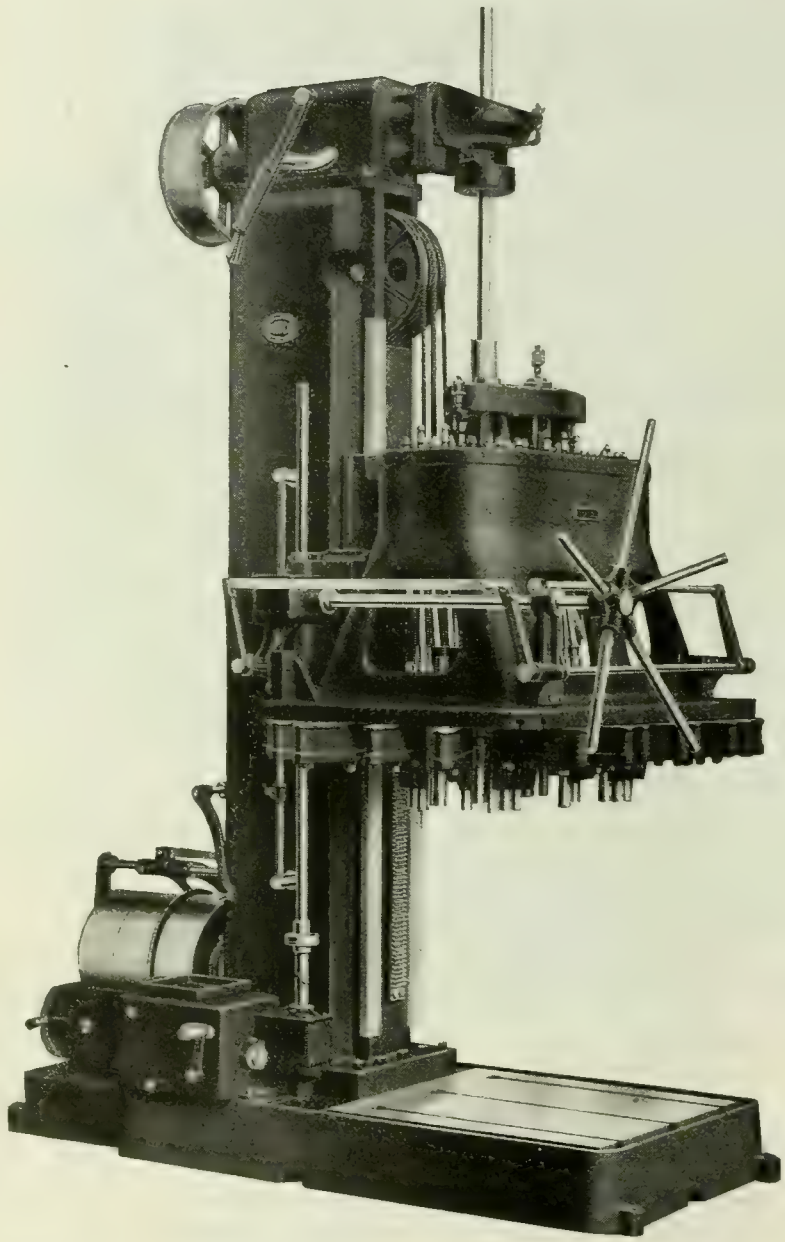

No. 30

No. 30 NATCO with Patented Independent Change of Speed to each individual drill.

NATCOS are made in 11 sizes, ranging from 2 to 72 spindles.

We have told you what the NATCO is doing for others in the way of drilling, tapping, spotfacing and counterboring.

Now let us tell you what it will do for you.

We also decipe and build Jigs and Fixtures for use in conection with NATCO Multi-Drillers.

THE NATIONAL AUTOMATIC TOOL COMPANY
RICHMOND, INDIANA, U.S.A.

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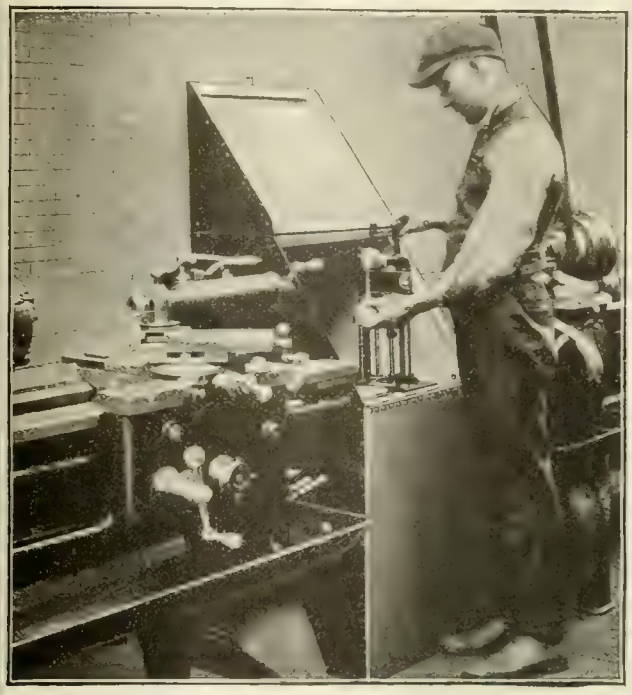
Prevent Idle Time
of Men and Machines



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There is no going back and forth to the oil room, no spilling, no wasted oil, no fire risk from the oil storage.

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The oil supply can be stored and handled as systematically as raw materials or finished parts—income checked, distribution measured, charged and recorded.

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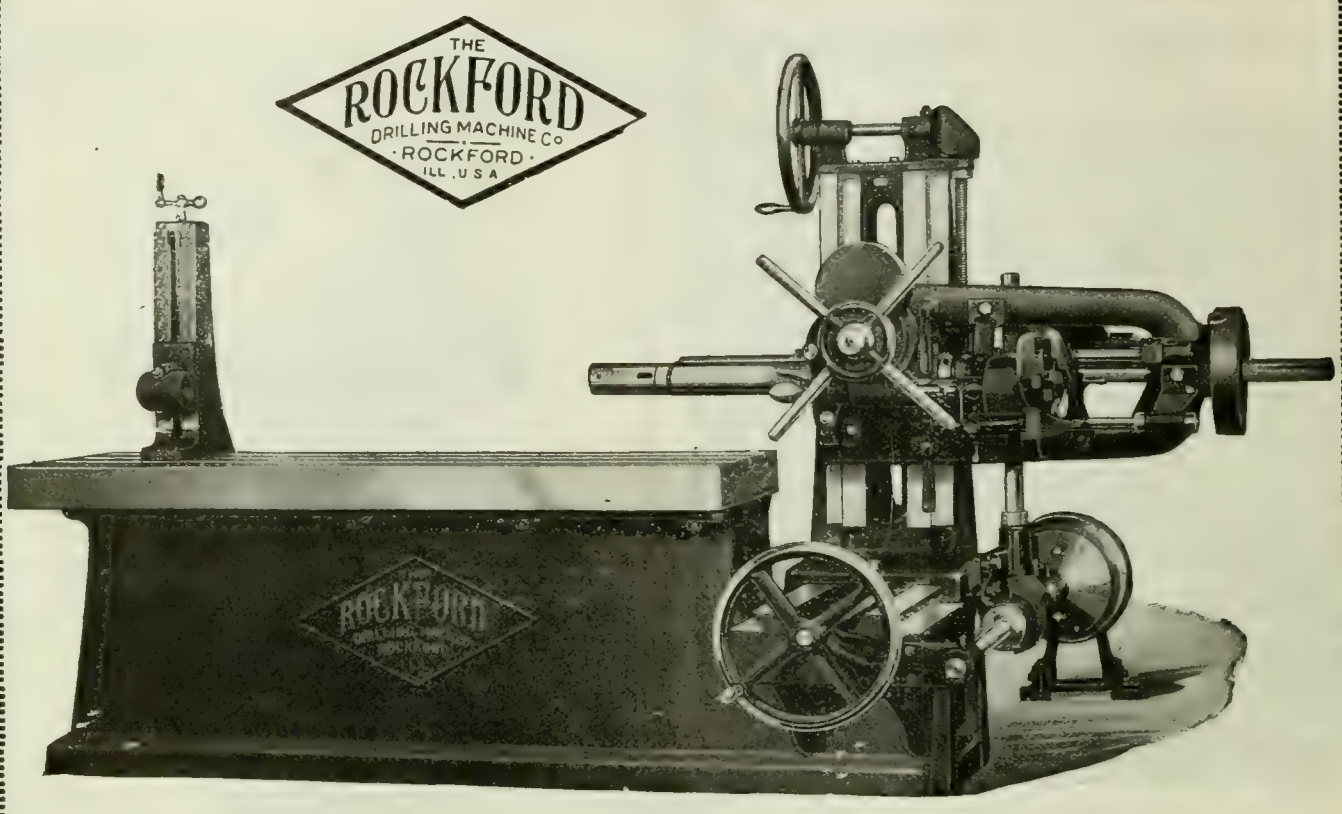

A Horizontal Boring Machine

For Heavy Duty or Fine Jig Work

This wide range machine has the strength and rigidity to drive 2-inch high-speed drills to capacity and boring tools up to 8 inches and over, but is so carefully balanced and nicely adjusted as to adapt it equally well to the finest jig work.

Lateral and vertical adjustment of the head to permit the spindle to operate anywhere over a surface 18 by 36 inches; spindle of special forged steel, ground to size, has long nose with $\frac{5}{8}$ x $\frac{5}{8}$ slot in the end and is provided with ball thrust bearings. Steel gears provide nine different speeds without stopping the machine and the automatic trip guards against the spindle being advanced beyond its intended range of movement.

Six styles of drive: 2, 3 and 4-step cone with back gears, and 5, 4 and 3-inch belt respectively; gear box with tight and loose pulley; variable speed motor, directly connected, and constant speed motor with gear box (as illustrated). Complete description in Circular R-1.

Say you want all particulars.

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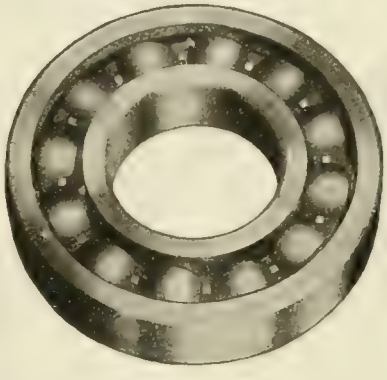

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Pressed steel ball bearing wheels and sheaves.

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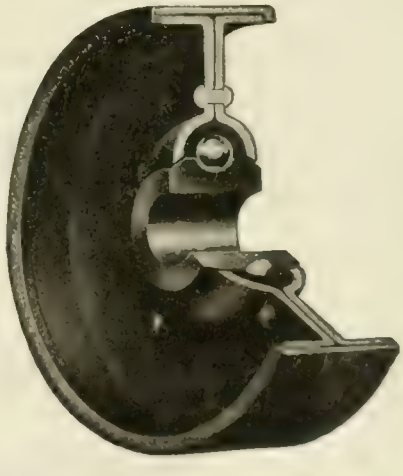

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MOUND IMPROVED HOLLOW GROUND SCRAPING TOOLS
No 2 Set of 6
FOR SCRAPING METAL BEARINGS, VALVES, ETC.
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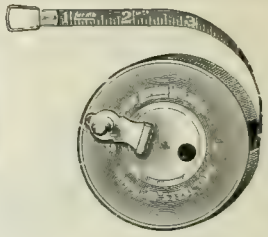

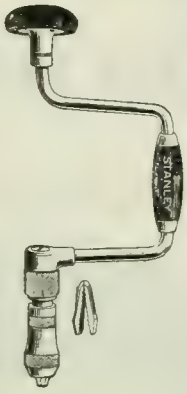

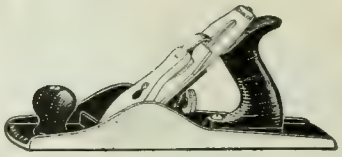

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Made in Canada—built for service.

This cabinet is strongly made and handsomely finished to suit the individual buyer, drawers slide easily and noiselessly, locks securely.

Style 5, shown here, made in two sizes. Send for prices.

For seventy years the Rice Lewis tool department has earned a reputation for quality and service.

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Write for particulars and prices, also samples gladly given for testing purposes.

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Dull Files, Dull Workmen

You cannot get the best out of men working with dull tools.

The personal satisfaction they get out of working with sharp, well balanced tools makes for contentment.

It is better to throw away a dull file and buy a new one than to "economize" by keeping the dull file in use.

"Famous Five" Files give maximum returns because the steel in them is accurately cut and properly hardened.

Order them. They are:

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ACCURACY ASSURED

You can always depend upon Dunbar Springs being accurate. Before proceeding with any order the first few springs are carefully tested and checked up for this very purpose.

Seventy-two years' experience making flat and spiral springs of every description enables us to furnish you with springs of the highest quality, that can be depended upon under all conditions.

Send blue prints for estimates.

The Dunbar Brothers Co.
BRISTOL, CONN

The Hammer With The Human Stroke

HEADS RIVETS COLD

Heads 'em tight or loose, flush, countersunk, or finishes heads any shape desired, and at the rate of:—

A rivet a second, sizes up to 3/16".
A rivet in two seconds, size ¼" to ⅜".
A rivet in three seconds, size 7/16" to ⅝".

And on special order we build machines to handle rivets up to 1½" with proportionate rapidity.

Built in eight sizes.

Besides riveting, the High Speed Riveting Hammer does all kinds of peining, swaging, upsetting, etc.

Send us sample assembly parts with rivets or sketch of your work,

and

Let us shoulder your riveting problems.
Send for the High Speed Hammer Book.

THE HIGH SPEED HAMMER COMPANY, INC.
ROCHESTER, N.Y.

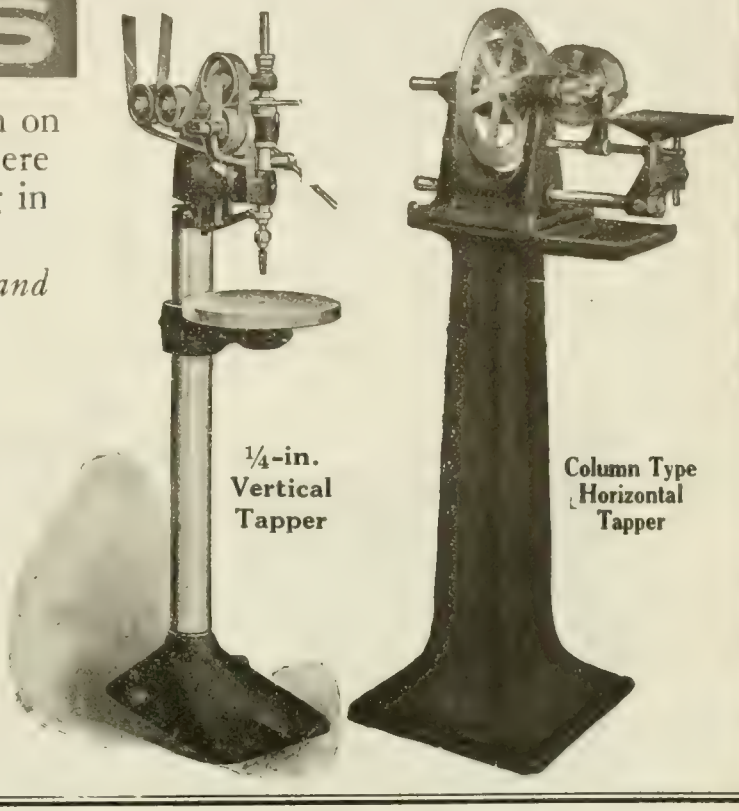
RICKERT-SHAFER TAPPERS

Save Tap Breakage

The *smooth drive* reduces the strain on the taps—they wear longer—and there are fewer delays from taps breaking in the work.

R-S Tappers ensure faster tapping and quicker assembling.

Friction drive, absorbing all the shock, allows a chuck speed of 140 r.p.m. on ⅝-in. work—50 per cent. faster than the usual tapping speed for that size. Uses but 1 h.p.



¼-in. Vertical Tapper

Column Type Horizontal Tapper

Write for specifications

The Rickert-Shafer Co.

ERIE, PA., U.S.A.

FRED HERBERT, Foreign Agent, Coventry, England.

The "Boehm" Positive Opening Threading Die

Hardened and Ground Guides for the Chasers

This Is One Distinct Feature of the

"Boehm"

The "Boehm" Positive Opening Threading Die has a positive opening and closing cam action.

Chasers have the necessary radial movement to enable the die to open after the threading operation has been completed. They are supported by a cam ring throughout their entire length and width. Incidentally—

The chasers slide between hardened and ground guides, and are supported by carriers which have a groove in the outer end for the positive opening cam.

This cam, the locking pins, and the "float" have features that add to the distinctiveness of the "Boehm."

We will be glad to send you complete description.

The Rickert-Shafer Co.

ERIE, PENN.

LANDIS

For Efficient, Dependable Service On Big Work

The Landis 12" x 96" and 12" x 120", Plain

There are many just claims we could make regarding the superiority of Landis Plain Grinding Machines.

We prefer, however, to let you form your own opinion by watching the Landis in operation.

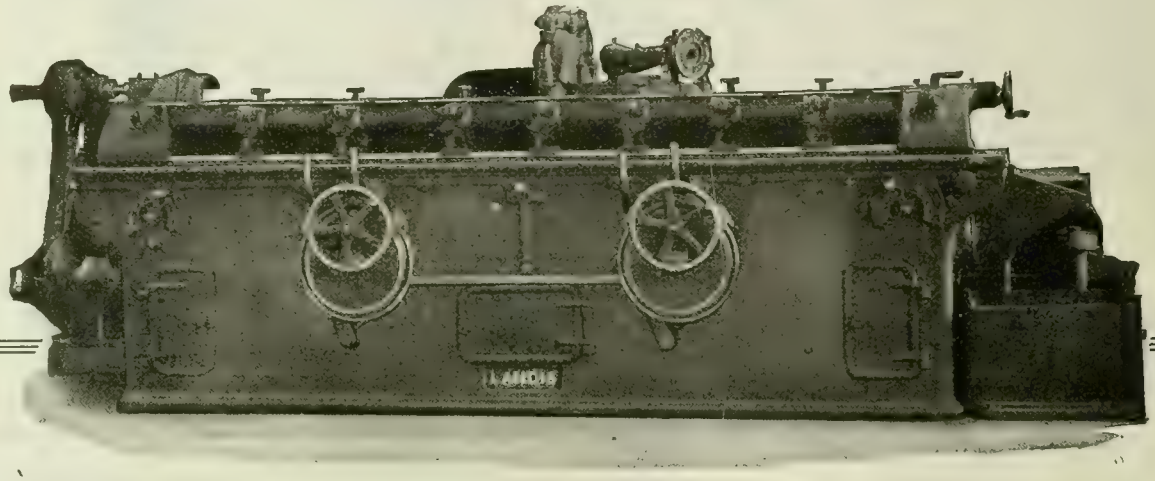
We'll tell where you can see the Landis right in your neighborhood turning out highly efficient, dependable work. The grinding is done by the wheel traveling and the work remaining stationary.

Write us if interested in getting a first-hand impression.

Have you our catalog?

LANDIS TOOL COMPANY, Waynesboro, Pennsylvania, U. S. A.

NEW YORK CITY: 50 CHURCH STREET



FOR CONNECTING ROD BEARINGS

A further demonstration of the Excellence of

MAGNOLIA METAL

PERKINS MACHINE & FOUNDRY CO. INC.
FOUNDERS AND MACHINISTS
Amsterdam, N.Y.

May 13, 1919.

Magnolia Metal Co.,
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Gentlemen:—

The writer has used MAGNOLIA METAL for 18 years with excellent results.

Have used MAGNOLIA on Dynamo and Engine Bearings (Connecting Rods more particularly) and claim it to be the most excellent metal for hardest service obtainable. Am glad, indeed, to be able to recommend it.

Beg to advise that I am a mechanical man of many years experience, having handled all kinds of Babbitts, and MAGNOLIA METAL is my preference.

Yours truly,

PERKINS MACHINE & FOUNDRY CO.,
Augustus H. Morrison,
Engineer and Manager.

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Plus
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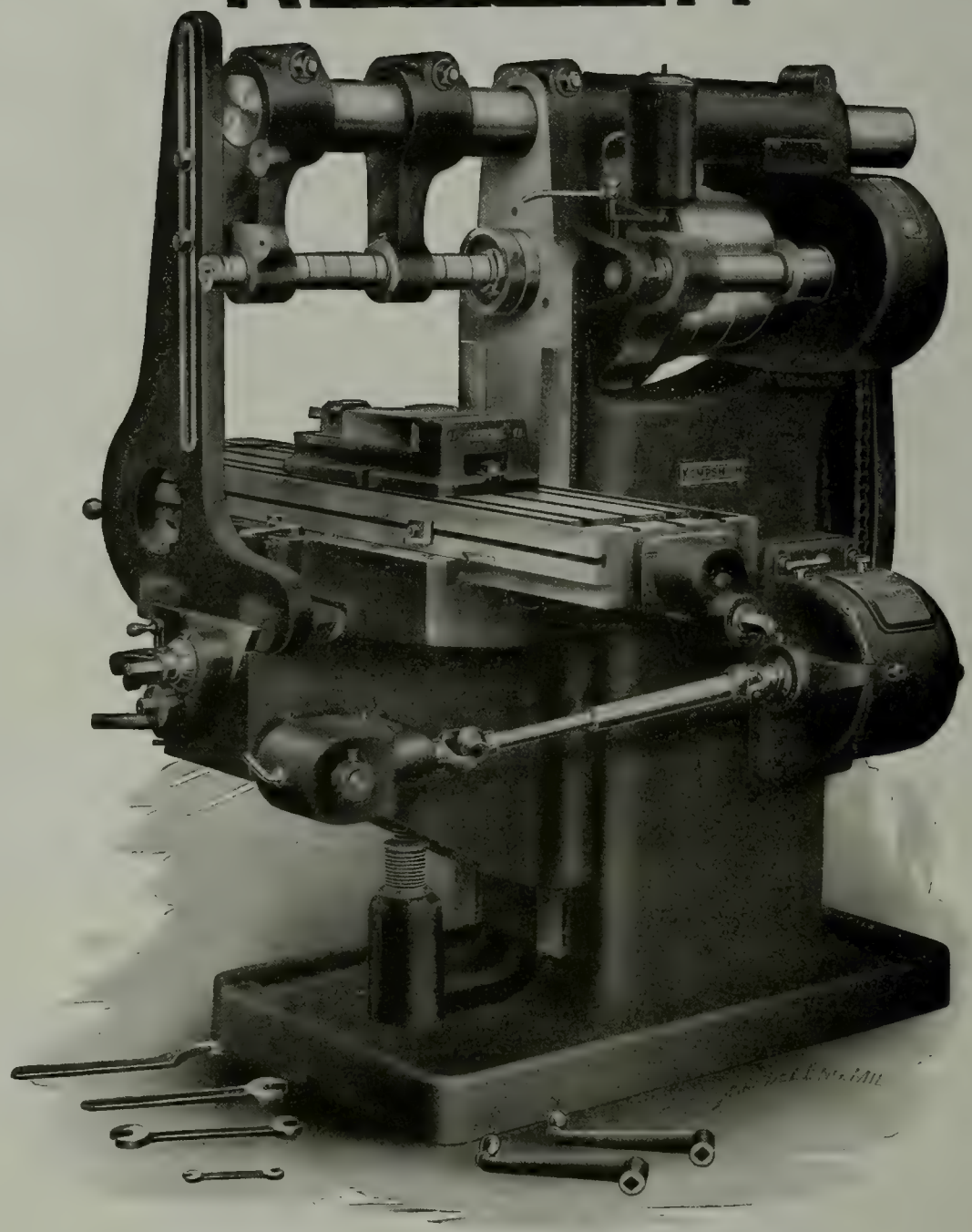
KEMPSMITH



KEMPSMITH No. 3 Plain Milling Machine

Double Back Geared.

THE KEMPSMITH MANUFACTURING CO., Milwaukee, Wis., U.S.A.

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The GEO. F. FOSS MACHINERY & SUPPLY Co.
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RACINE HACK SAW

The merit of a world's record in accuracy and economy stamps this machine as distinctive among metal-cutting machines.

The value of the Racine machine has been demonstrated so thoroughly that we will send you any machine you may select upon approval.

Send for our catalogue and make your choice to suit your requirements.

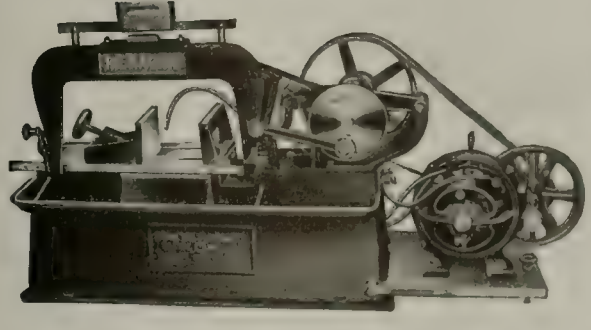
Stock up to 12" x 12". Motor or belt driven.

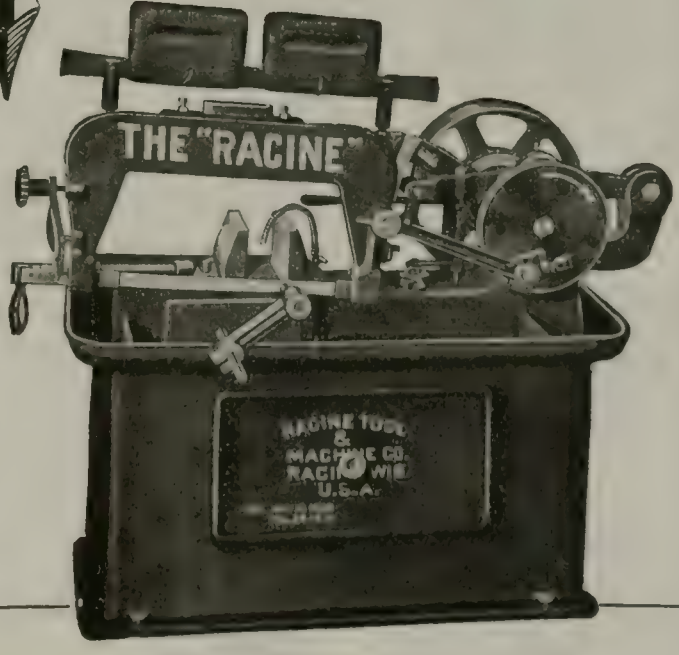
We guarantee the accuracy of the Racine.

On the reverse the Racine lifts the blade so that wearing on the cutting edge of the blade is eliminated.

We guarantee to keep every machine we sell supplied with Racine H.S. Tungsten Blades.

Racine Tool & Machine Co.
Melbourne Avenue
RACINE, WISCONSIN, U.S.A





The GEO. F. FOSS MACHINERY & SUPPLY Co.
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305 St. James Street - Montreal, Quebec

One Great Advantage

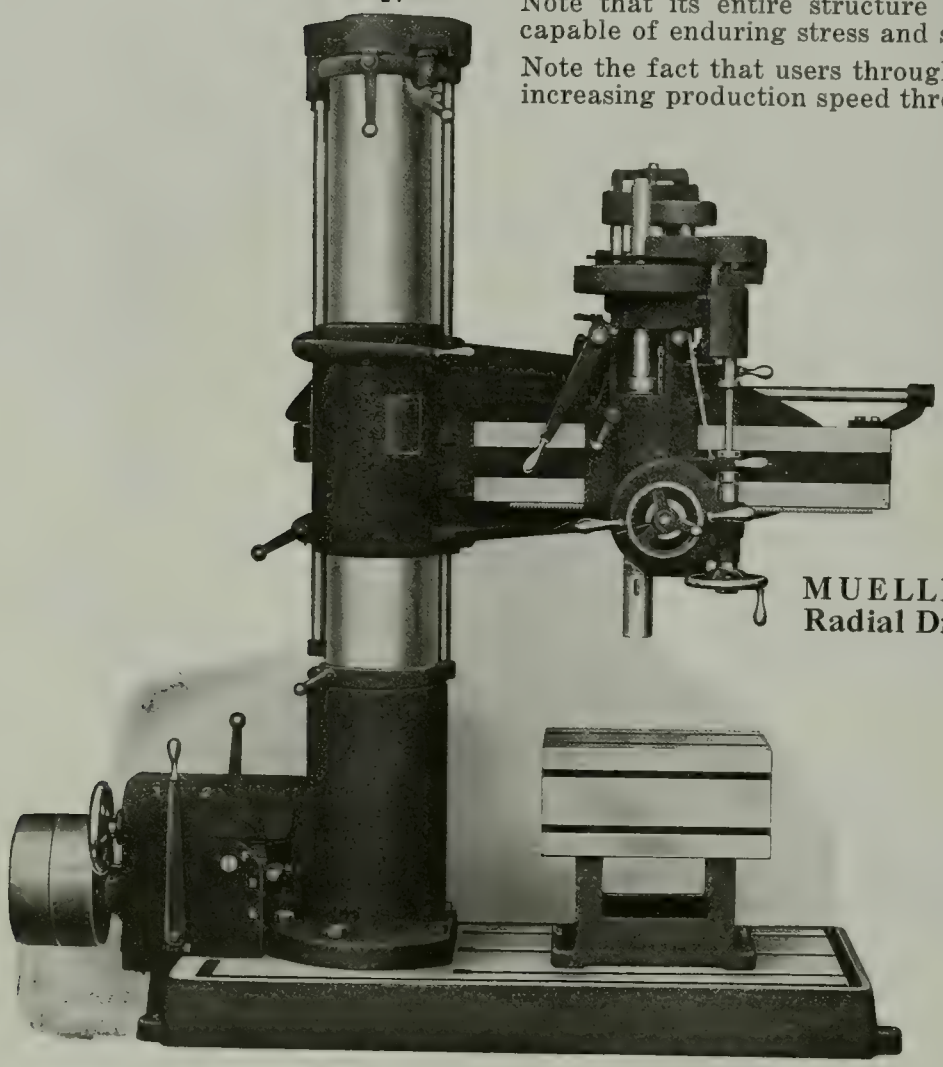
which the Mueller Radial Drill has over other radials is its Patented Stationary Column.

Note its strength—one-piece and stiffened by four internal webs.

Note the fact that every control lever is within easy reach of the operator.

Note that its entire structure is firm, rugged and capable of enduring stress and strain.

Note the fact that users throughout the country are increasing production speed through its use.



MUELLER
Radial Drill

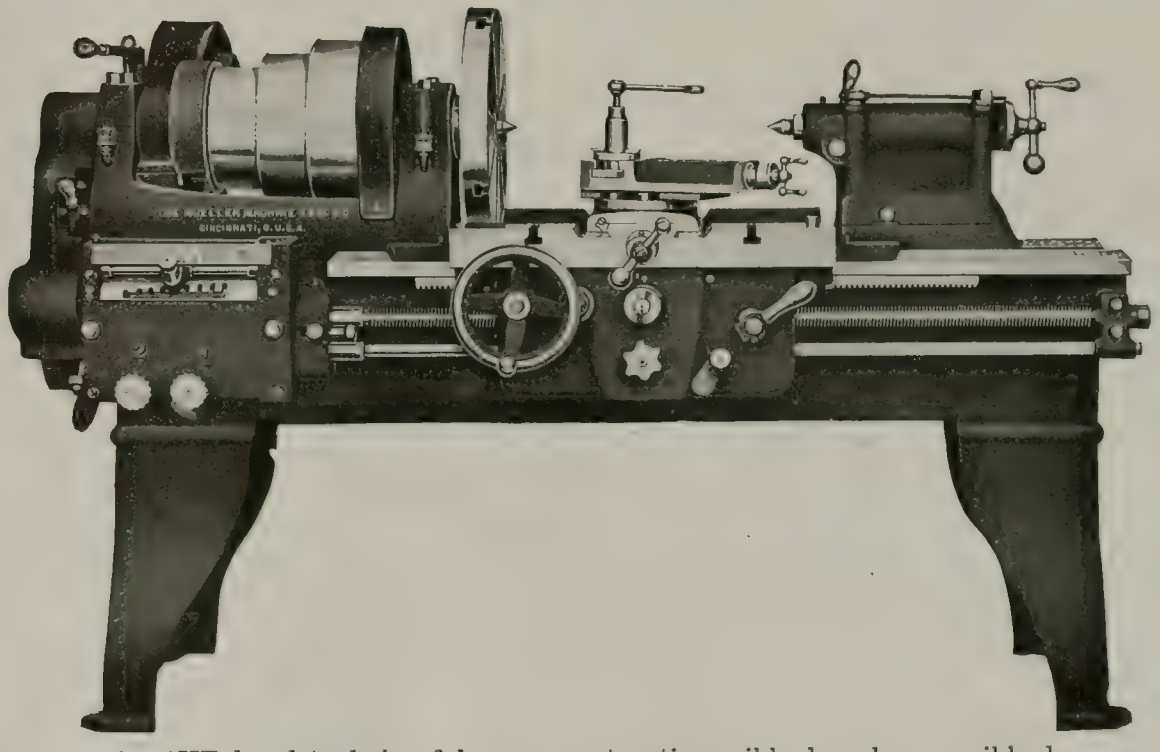
Note the bearing surface of the arm on the column.

The Mueller Machine Tool Co.

Radial Drills and Lathes
Cincinnati, Ohio

The GEO. F. FOSS MACHINERY & SUPPLY Co.
LIMITED
305 St. James Street - Montreal, Quebec

MUELLER HEAVY DUTY ENGINE LATHE



THE headstock is of heavy construction, ribbed and cross-ribbed. The tailstock is very massive in its proportion, with two 7/8-inch bolts for clamping it to the head. It is arranged for two plug clamps, to lock the tailstock without throwing it out of line. The double back gears are of the slip gear type. The spindle is made of high carbon crucible steel, ground to size. Spindle boxes are of phosphor bronze, bored and hand scraped, to fit spindle. The spindle is provided with means for any necessary adjustment. There are eighteen spindle speeds on the machine. Forty-five changes of thread can be cut, ranging from two to sixty, including 11½ pipe thread. All changes are obtained within the quick-change gear box itself. All threads can be cut without the removal or addition of a single gear. The bed is unusually deep and braced its entire length. The carriage is very rigid and capable of withstanding the heaviest strains. Double plate apron is furnished. Steel gears throughout. Sight feed oilers. Automatic stop for carriage.

Write for interesting circular describing machine in detail.

THE MUELLER MACHINE TOOL CO.
Radial Drills and Lathes CINCINNATI, OHIO, U.S.A.

The GEO. F. FOSS MACHINERY & SUPPLY Co.
LIMITED
305 St. James Street - Montreal, Quebec

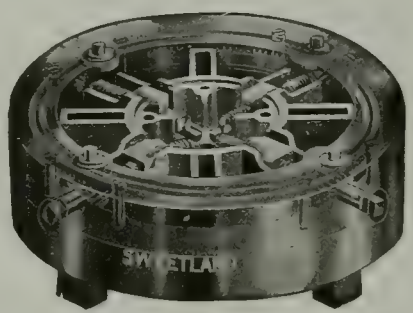
Chucking for Profit

Means the Use of

Sweetland Chucks

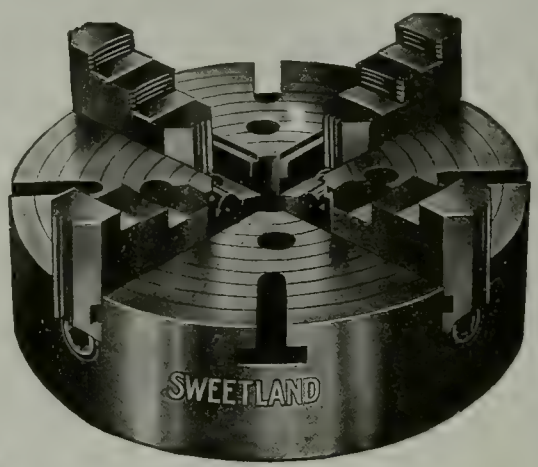
as they increase production remarkably by conserving the time and energy of men who operate them.

Note particularly the Sweetland Combination Chuck on the left, for all practical mechanics consider it the best Geared Screw Chuck made. Of simplest possible construction, still complete in its interchangeability from independent to universal operation of the jaws, **or vice versa.**



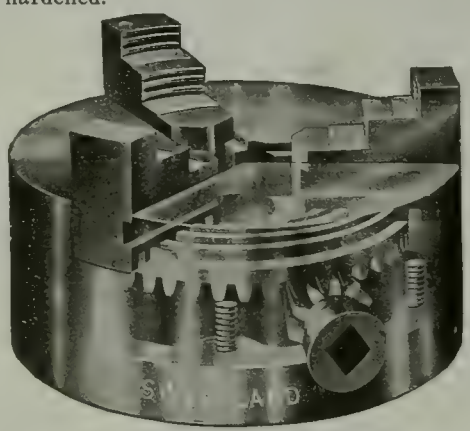
Independent Lathe Chuck

The gripping and gearing surfaces, both of hardened steel, are ground perfectly true. The large screws of special grade steel are flush with the body of this Sweetland Independent Lathe Chuck. The strong jaws are high-grade steel, properly hardened.



Universal Chuck

This Sweetland Chuck has been on the market for over 40 years. Many that long in use are good as ever for accurate chucking work.



Geared Scroll Chuck

Opposite is another Sweetland Chuck, with hardened jaws ground perfectly true on face and bite. Sizes 2½" to 18" dia, both with three and four jaws.

When so ordered this Sweetland Scroll Chuck is supplied with Solid Reversible Jaws—two sets in one; or with Non-Reversible Inside or Outside Jaws, or with both sets.

Hoggson & Pettis Manufacturing Company

NEW HAVEN, CONN., U.S.A.

The GEO. F. FOSS MACHINERY & SUPPLY Co.
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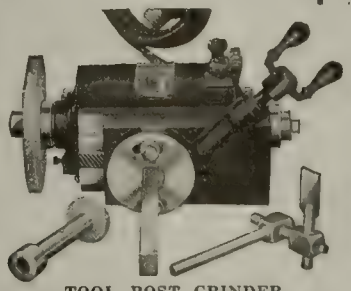
"CINCINNATI ELECTRICS" Will Do It!



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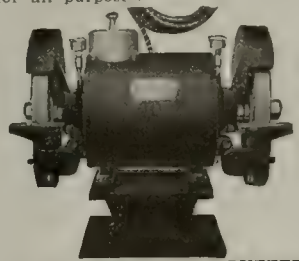
¼ to 3 H.P. Weight from 16 pounds up. Free hand feed. Bearings adjustable to wear. Horizontal and vertical feeds. Different types for all purposes.



BENCH GRINDER OR BUFFER
Five sizes, ¼ to 3 H.P. Also Pedestal Floor Grinder, 1 to 3 H.P. Fully enclosed. Dirt and dust-proof. Ball bearings.

SPECIAL FEATURES

Air cooled. Ball and Thrust Bearings. All working parts hardened. Overload Allowance. Guaranteed Mechanically and Electrically.

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HAND OR BREAST DRILLS
$\frac{1}{4}$", $\frac{3}{8}$", $\frac{1}{2}$", $\frac{3}{4}$" capacities. Weight from 7 pounds up. Ball and thrust bearings. Gears run in grease. Single and two speeds.

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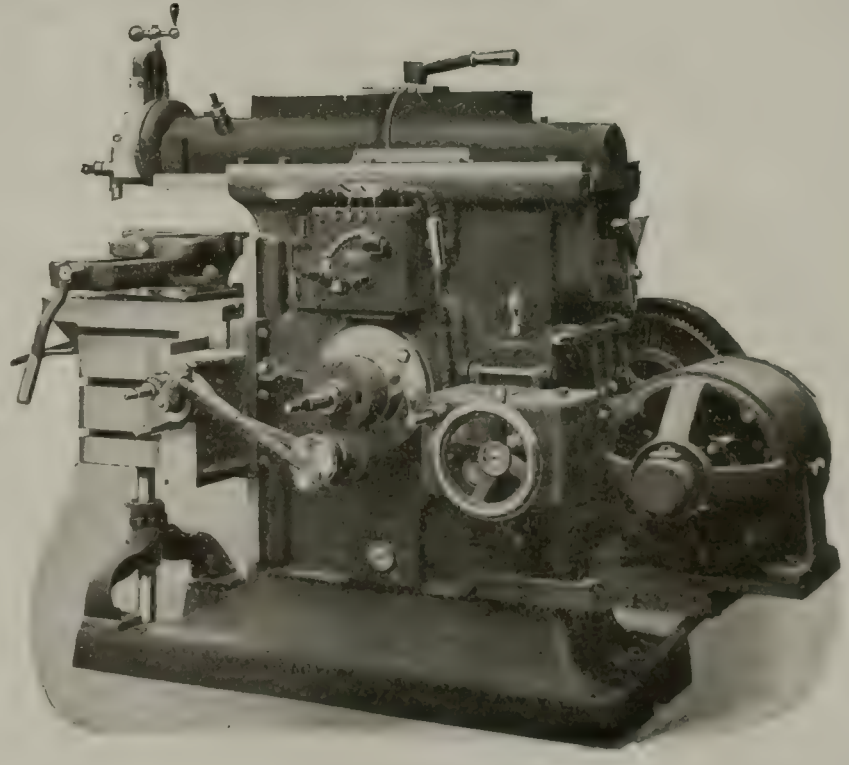
For cleaning castings or surface work of any kind. Made in four sizes, ¼ to 2 H.P. Weight from 18 pounds up. Guaranteed for hard usage.

SMITH & MILLS SHAPERS

Permit Changing the Stroke Without Stopping the Machine

No stopping the flow of production with the Smith and Mills. You can change the length of the stroke, whether to shorten or lengthen it, without stopping the machine. You need only loosen locking screw and stop the shaft revolving and the adjustment is made very quickly.

The helical gear on bull wheel eliminates shock. A wrist-pin gear, fitted to the bull gear in an eccentric form, replaces the conventional bevel gear arrangement in the bull wheel. It's an ideal shaper for speed and accuracy. Send for details.



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Cincinnati, Ohio, U.S.A.

The GEO. F. FOSS MACHINERY & SUPPLY Co.
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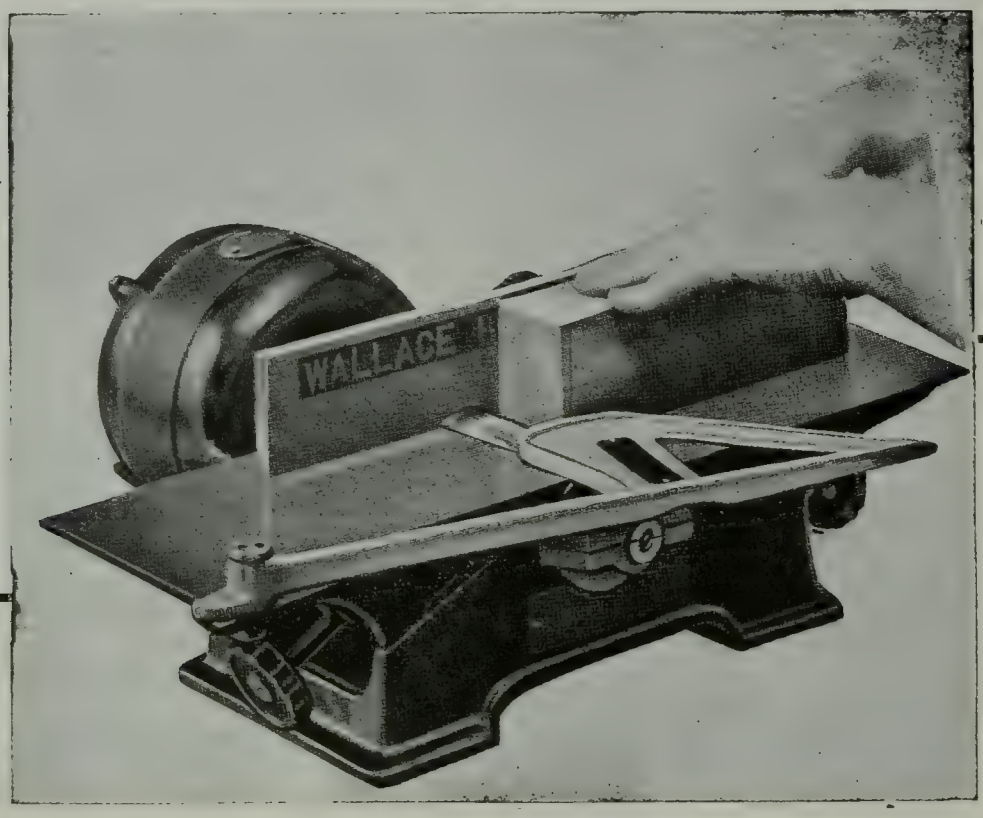

WALLACE Bench Planer

"Speeds Up" Production Cuts Cost

THE bulk—or about 70 per cent.—of your fitting, trimming, jointing or surfacing is on work less than 4 feet long and 4 inches wide. For lack of better facilities you have had to **do** all this work by hand—at an enormous cost. If every operation were as costly you'd close up shop. You can't afford to run to the big stationary jointer with each piece of work —yet that cost must be cut.

THE Wallace Bench Planer was designed especially for small work. It is the quick action machine you need to turn out that bulk of your planing, surfacing, beveling, jointing and fitting efficiently—economically. That's why it's busy in the General Electric, Westinghouse, Reaser Furniture, Long Furniture, Brunswick-Balke-Collender, National Malleable Casting, Pierce-Arrow, Jackson Sash and Door, and hundreds of other shops, from the biggest to the "one man" cabinet, pattern, carpenter shops, etc. In many shops it takes care of **all** the work.

It is portable—works right on the bench—handy at the elbow of your men.

Try this remarkable, simple, cost-saving machine. Stop those daily losses!

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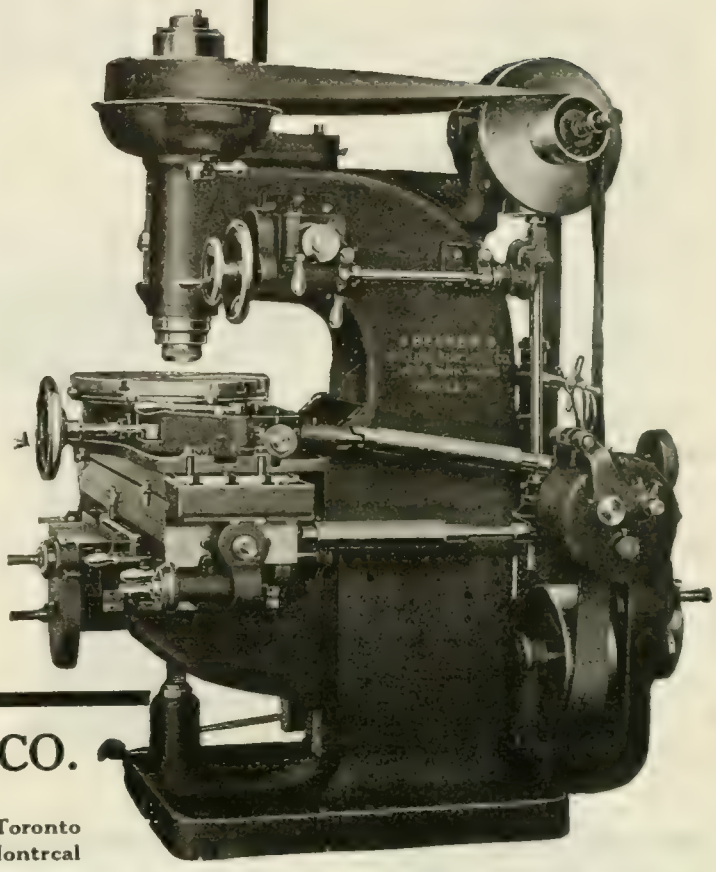

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Pneumatic DRILLS and Hammers

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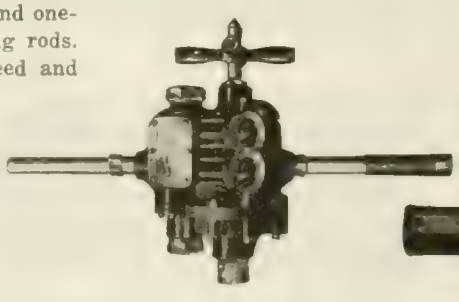

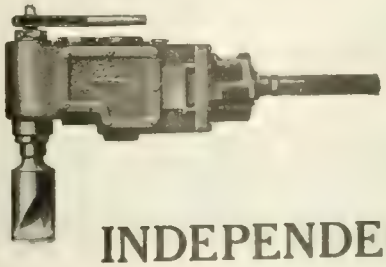

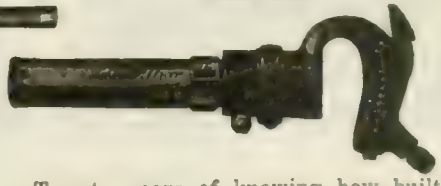

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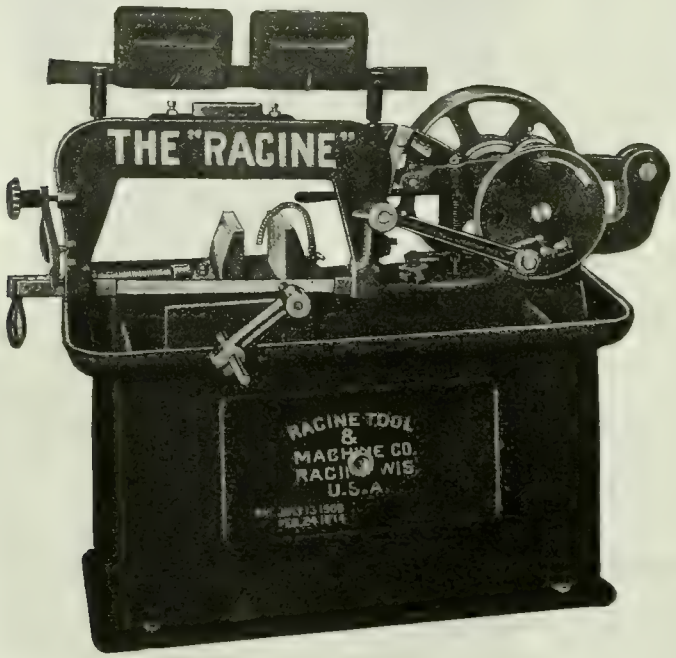

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Reduces Blade Expense

Aside from its ability to turn out more work than any other metal cutting machine, "THE RACINE" will save you considerable money on blades alone—enough to pay for itself in a reasonable time. The automatic lifting device is responsible for that. It automatically raises the blade on the return stroke, relieving it of all dragging or strain. This also means quicker cutting, less power used and greater production.

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Use "Racine" H.S. Tungsten Power Blades

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UNEQUALED IN QUALITY ANY SIZE OR LENGTH

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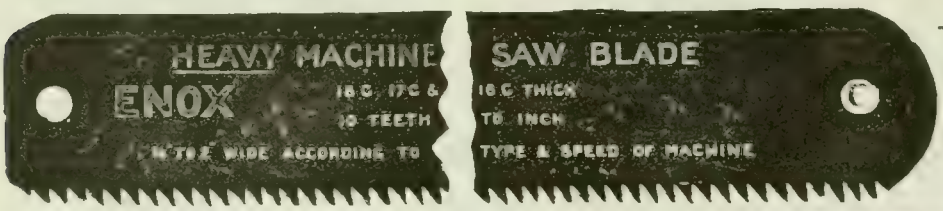

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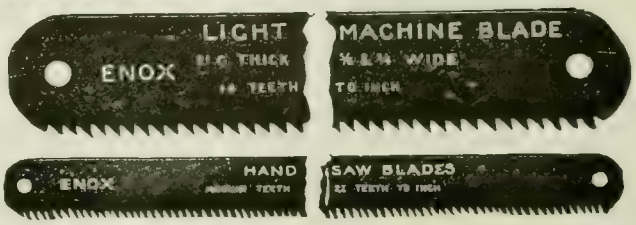
Hacksaw Blades
ARE THE BEST



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Here is an important factor in the heat treatment of metals. An intense heat, rapidly developed, and always under accurate control of the operator, are features that distinguish

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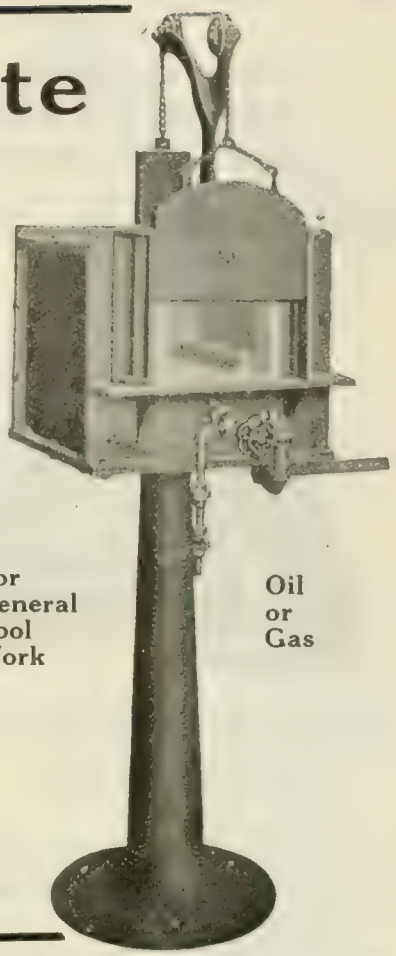
These tool forges are particularly adapted for the requirements of the small machine shop for annealing and tempering dies, cutters, reamers, etc.

Combustion is perfect and no flames come in contact with material. Built to stand the highest temperature. Doors are properly counterbalanced. In every way BELLEVUE FURNACES meet with the demand for durability, efficiency and convenience.



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Oil or Gas

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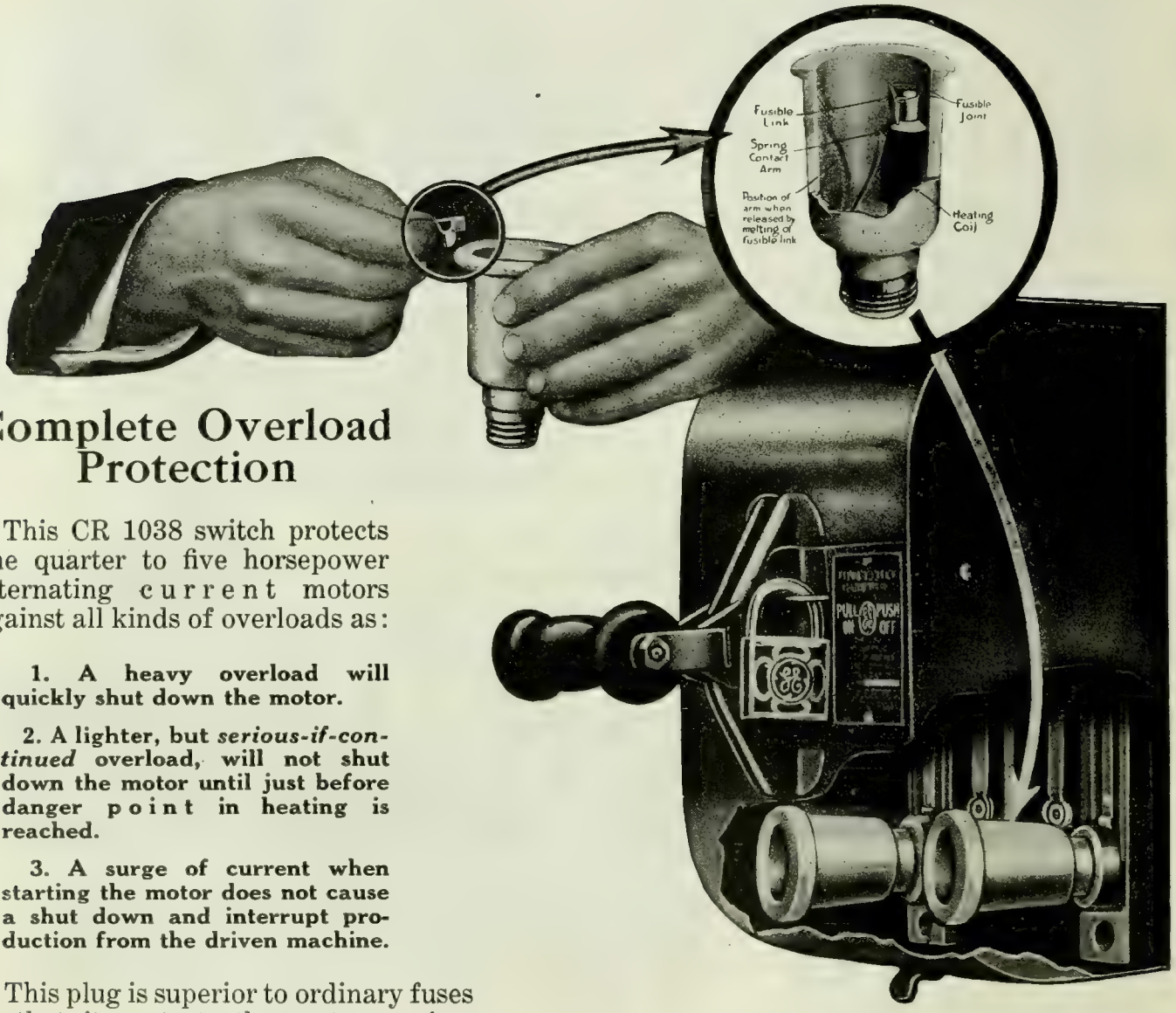

Complete Overload Protection

This CR 1038 switch protects one quarter to five horsepower alternating current motors against all kinds of overloads as:

1. A heavy overload will quickly shut down the motor.

2. A lighter, but *serious-if-continued* overload, will not shut down the motor until just before danger point in heating is reached.

3. A surge of current when starting the motor does not cause a shut down and interrupt production from the driven machine.

This plug is superior to ordinary fuses in that it protects the motor against overloads, which are serious because continued, while the former protected only against peak overloads.

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A small spring switch in the porcelain protective plug shown is held shut by slipping a little link over its end. If a current large enough to injure the motor flows through the plug the fusible joint of the link is melted by the heating coil. For the cost of a postage stamp the link can be renewed and plug made operative again.

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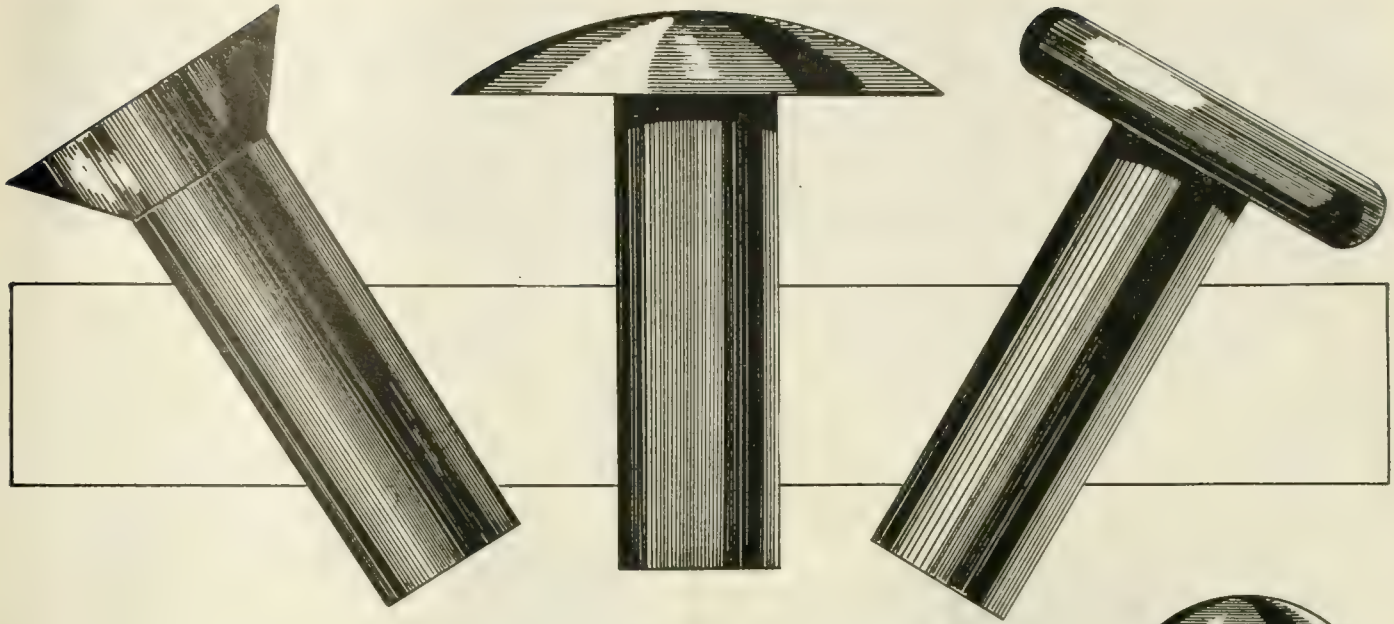

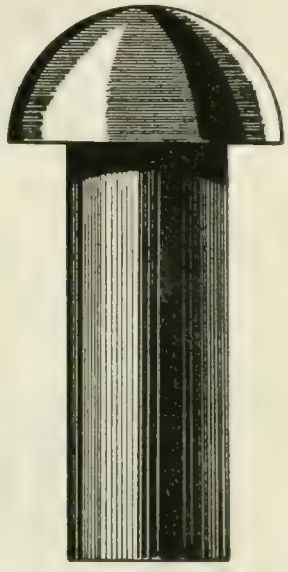

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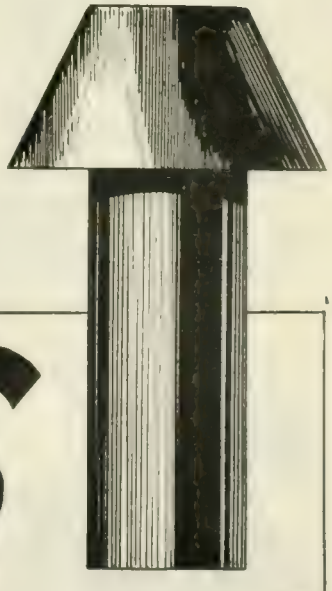

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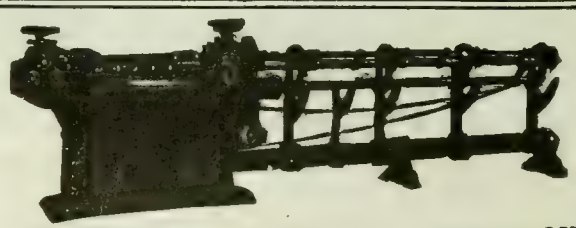

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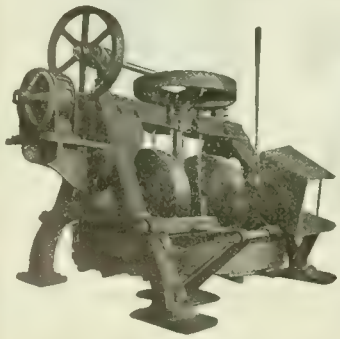

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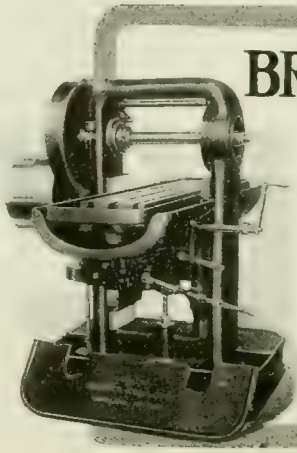

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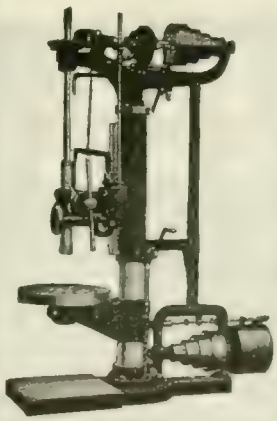

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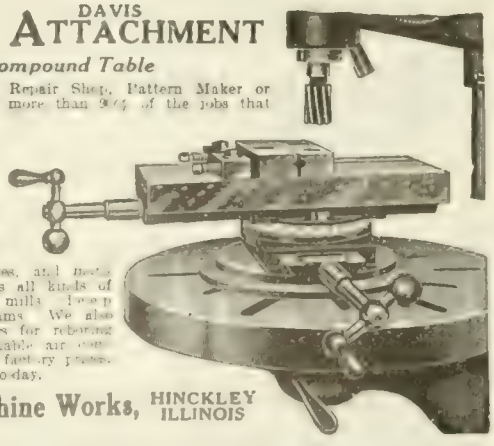

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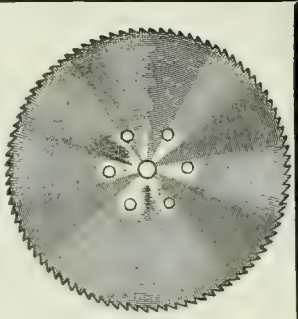

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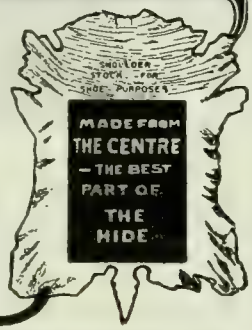

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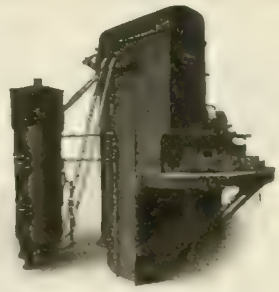

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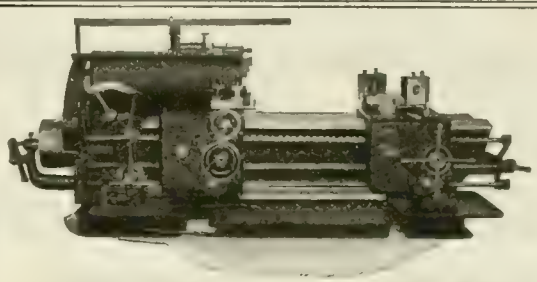

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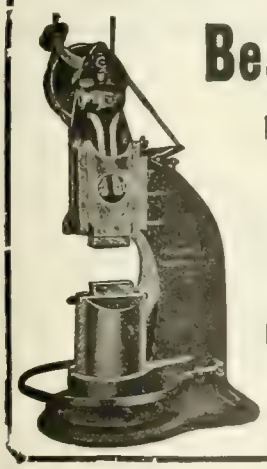

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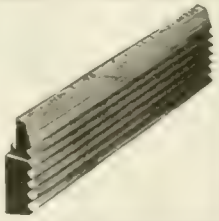

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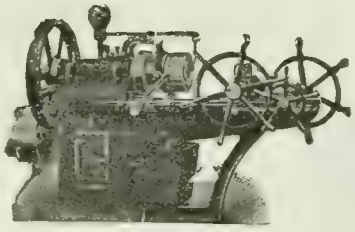

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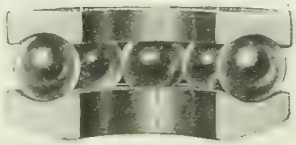

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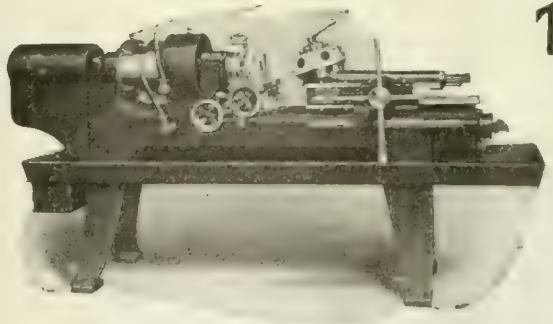

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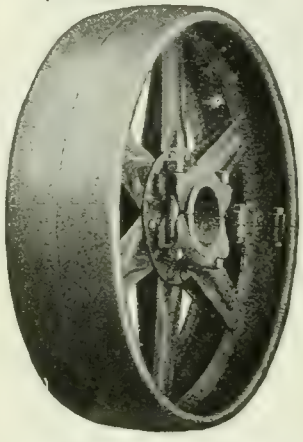

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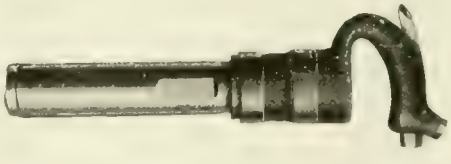

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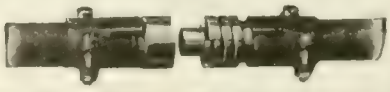

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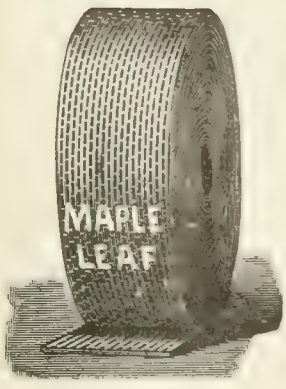

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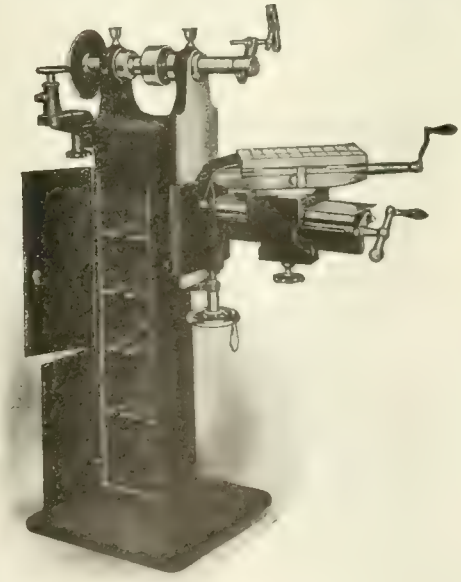

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Dennis Wire & Iron Works, London, Ont.
Page Steel & Wire Co., Adrian, Mich.
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Boker & Co., Inc., H., Montreal, Que.
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Williams & Wilson, Ltd., Montreal.

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Wilkinson & Kompass, Hamilton, Ont.
Williams & Wilson, Ltd., Montreal.

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Peerless Machine Co., Racine, Wis.
Perfect Machine Co., Galt, Ont.
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Jones & Glassco, Montreal.
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Williams & Wilson, Limited, Montreal.

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Pratt & Whitney Co., Dundas, Ont.
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Wells Bros. of Canada, Galt, Ont.

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Garlock-Walker Machinery Co., Toronto.
Ford Chain Block & Mfg., Philadelphia.
Independent Pneumatic Tool Co., Chicago.
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Northern Crane Works, Walkerville, Ont.
Wright Mfg. Co., Lisbon, Ohio.
Williams & Wilson, Limited, Montreal.

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Northern Crane Works, Walkerville, Ont.
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Garvin Machine Co., New York.
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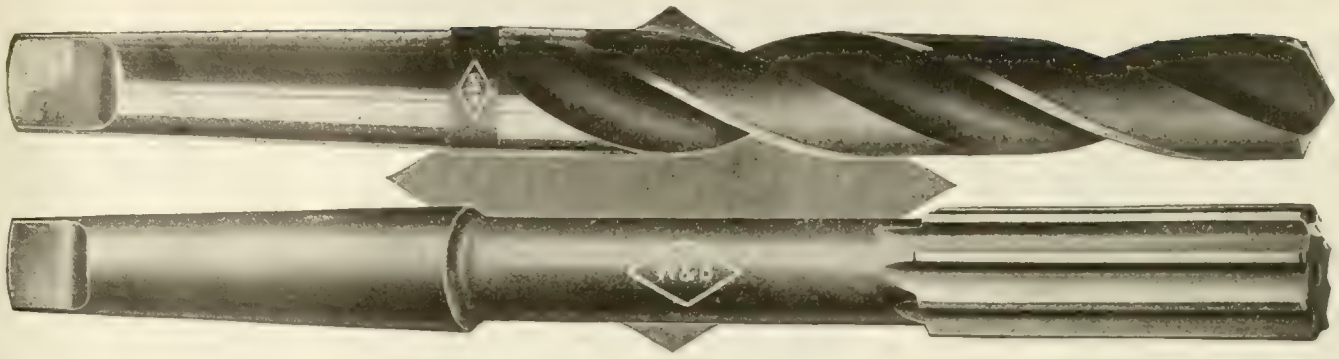

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Matthews & Co., Jas. H., Pittsburgh, Pa.

MARKING MACHINERY
Brown, Boggs Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal
Perrin, Wm. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MASKS, WELDING, SMOKE, FUME, GAS, ETC.
Strong, Kennard & Nutt Co., Cleveland.

MEASURING MACHINES
Pratt & Whitney Co., Dundas, Ont.

MEASURES, REGISTERING
Bowser & Co., S. F., Inc., Fort Wayne.

MEASURING TAPES AND RULES
Chesterman & Co., Jas., Sheffield, Eng.

METALLURGISTS
See Chemists.

METAL SAWS
See Saws.

METAL SAWS, POWER
Hoefer Mfg. Co., Freeport, Ill.

METALS
Brown's Copper & Brass Rolling Mills, New Toronto, Ont.
Canada Metal Co., Toronto, Ont.
Rice Lewis & Son, Toronto, Ont.
Standard Machy. & Supplies, Montreal.

METAL, STAMPINGS, SMALL
Can. Winkley Co., Ltd., Windsor, Ont.

METERS, OIL, GASOLINE, KEROSENE, ETC.
Bowser & Co., Inc., S. F., Toronto, Ont.

MICROMETERS
Almond Mfg. Co., Ashburnham, Mass.
Taylor, J. A. M., 31² Stair Bldg., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MILLS, SAND
Frost Mfg. Co., Chicago, Ill.

MILL MACHINERY
Alexander Fleck, Ltd., Ottawa.
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

MILLING ATTACHMENTS
Becker Milling Machine Co., Boston, Mass.
Bertram & Sons Co., John, Dundas, Ont.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Foss Mchy. & S'ply Co., G. F., Montreal.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Mach. Co., Torrington, Conn.
Hinckley Machine Works, Hinckley, Wis.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Taft-Peirce Mfg. Co., Woonsocket, R.I.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, AUTOMATIC
Bilton Mach. Tool Co., Bridgeport, Conn.
Betts Machine Co., Rochester, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

MILLING CUTTERS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Cleveland Milling Machine Co., Cleveland.
Kearney & Trecker Co., Milwaukee, Wis.
Marshall, Son & Bunney, Toronto.
Williams & Wilson, Ltd., Montreal, Que

MILLING MACHINES HAND
Bristol Machine Tool Co., Bristol, Conn.

MILLING MACHINES, THREAD
Gisholt Machine Co., Madison, Wis.
Hardinge Bros., Inc., Chicago, Ill.
Gray Ball Bearing Co., Ltd., Toronto.
United States Mach. Tool Co., Cincinnati.
Pratt & Whitney Co., Dundas, Ont.
Rudel-Belnap Mach. Co., Ltd., Montreal.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, HORIZONTAL AND VERTICAL
Becker Milling Machine Co., Boston, Mass
Blomquish-Eck Mach. Co., Cleveland.
Bristol Machine Tool Co., Bristol, Conn.
Brown & Sharpe Mfg. Co., Providence.
Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Ford-Smith Mach. Co., Hamilton, Ont.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machy. Co., Toronto, Ont.
Gooley & Edlund, Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Kearney & Trecker Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
United States Mach. Tool Co., Cincinnati,
Whitney Mfg. Co., Hartford, Conn.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Becker Milling Machine Co, Boston, Mass.
Bilton Mach. Tool Co., Bridgeport, Conn.
Brown & Sharpe Mfg. Co., Providence.
Canada Machinery Corp., Galt, Ont.
Cincinnati Milling Machine Co., Cincinnati
Ford-Smith Mach. Co., Hamilton, Ont.
Foss Mchy. & S'ply Co., G. F., Montreal.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Gooley & Edlund, Inc., Cortland, N.Y.
Hardinge Bros., Inc., Chicago, Ill.
Hendey Machine Co., Torrington, Conn.
Kearney & Trecker Co., Milwaukee, Wis.
Kempsmith Mfg. Co., Milwaukee, Wis.
LeBlond Mach. Tool Co., R. K., Cincinnati
Niles-Bement-Pond Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING MACHINES, PROFILE
Brown & Sharpe Mfg. Co., Providence.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machy. Co., Toronto, Ont.
Garvin Machine Co., New York.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

MILLING TOOLS
Aikenhead Hardware Co., Toronto, Ont.
Brown & Sharpe Mfg. Co., Providence.
Ford-Smith Mach. Co., Hamilton, Ont.
Geometric Tool Co., New Haven, Conn.
Kempsmith Mfg. Co., Milwaukee, Wis.
Rice Lewis & Son, Toronto, Ont.
Tabor Mfg. Co., Philadelphia, Pa.
Williams & Wilson, Ltd., Montreal, Que.

MINE CARS
Can. Fairbanks-Morse Co., Montreal.
Dominion Bridge Co., Montreal, Que.
MacKinnon Steel Co., Sherbrooke, Que.
Modern Tool Co., Erie, Pa.
Pratt & Whitney Co., Dundas, Ont.

MINING MACHINERY
Can. Fairbanks-Morse Co., Montreal.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MIXERS, SAND
Frost Mfg. Co., Chicago, Ill.

MODEL WORK
Windsor Mach. & Tool Co., Windsor, Ont.

MORTISING MACHINES
Canada Machinery Corp., Galt, Ont.
Garlock-Walker Machy. Co., Toronto, Ont.
Gray Ball Bearing Co., Ltd., Toronto.

MOTORS, ELECTRIC
Can. Fairbanks-Morse Co., Montreal.
Can. General Electric Co., Toronto.
Garlock-Walker Machy. Co., Toronto, Ont.
Lancashire Dynamo & Motor Co., Ltd., Toronto.
MacGovern & Co., Montreal, Que.
Williams Mach'y Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

MOTOR SPRINGS
The Dunbar Brothers Co., Bristol, Conn.

MOTORCYCLE FRAME AND FORK
The Dunbar Brothers Co., Bristol, Conn.

MOTORS, PNEUMATIC
Cleveland Pneumatic Tool Co., Toronto.

MULTIPLE INDEX CENTRES
Garvin Machine Co., New York.

MULTI-DRILLING, MULTI-BORING, MULTI-TAPPING MACHINERY.
Nat. Automatic Tool Co., Richmond, Ind.

MUNTZ METAL
Brown's Copper & Brass Roller Mills, New Toronto, Ont.

NAIL SETS
Morrow Screw & Nut Co., J., Ingersoll, Ont

NAIL MACHINERY
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Pritchard-Andrews Co., Ottawa, Ont.
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NICHROME CASTINGS
Can. Driver-Harris Co., Ltd., Walkerville.

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Boker & Co., Inc., H., Montreal, Que.
Pilot Steel & Tool Co., Montreal, Que.

NICKEL SILVER
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NICKEL STEEL
Comstedt, J. F. A., New York City, N.Y.
Kayser-Ellison & Co., Ltd., Montreal.
Norton, Ralph B., Agent, Montreal.

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Hall & Sons, Ltd., John H., Brantford.
Landis Machine Co., Waynesboro, Pa.

NITROGEN
Carter Welding Co., Toronto, Ont.

NUTS, STEEL, CASTELLATED AND COLD PRESSED
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Williams & Co., J. H., Brooklyn, N.Y.

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Gaut Machine Screw Co., Galt, Ont.
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Garvin Machine Co., New York.
National Machinery Co., Tiffin, Ohio.
Victor Tool Co., Waynesboro, Pa.
Williams & Wilson, Ltd., Montreal, Que.

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Bertram & Sons Co., John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Garvin Machine Co., New York.
Hall & Son, J. H., Brantford, Ont.
Jardine & Co., A. B., Hespeler.
Landis Machine Co., Waynesboro, Pa.
National Machinery Co., Tiffin, Ohio.
Williams & Wilson, Ltd., Montreal, Que.

OIL SEPARATORS
Can. Fairbanks-Morse Co., Montreal.

OIL STONES
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Carborundum Co., Niagara Falls, N.Y.
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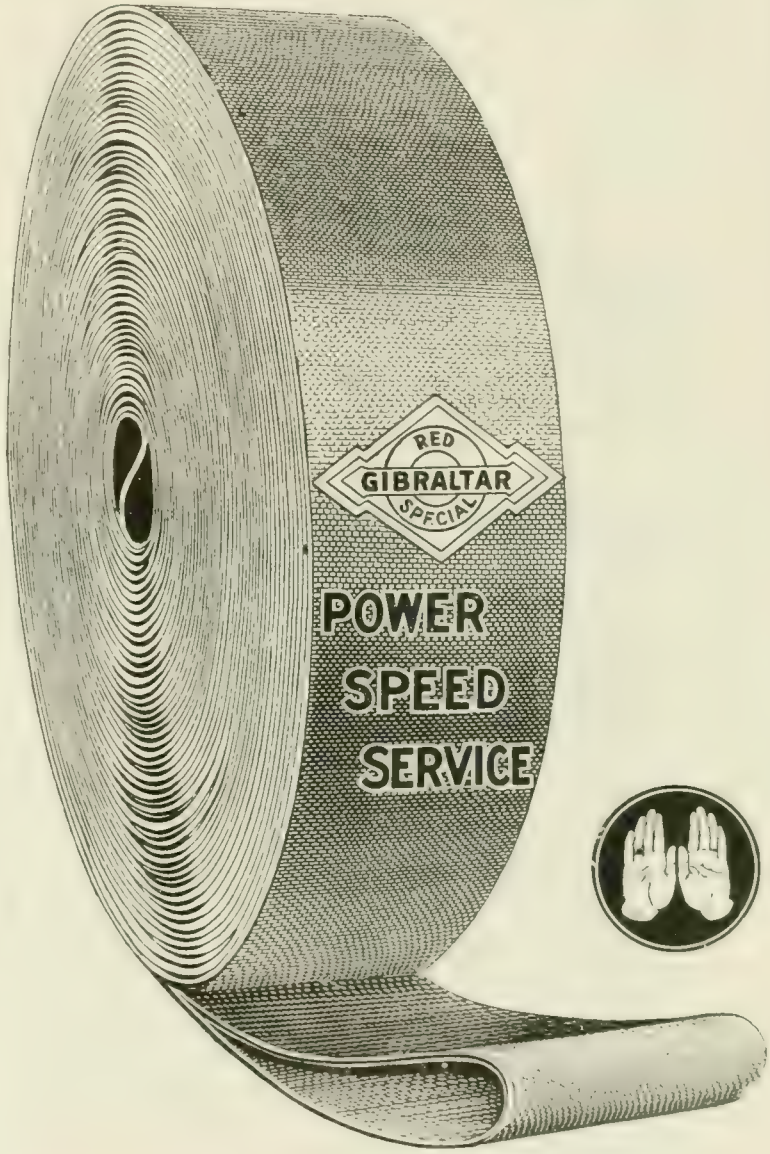

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MacKinnon Steel Co., Sherbrooke, Que.

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See Guards

PAPER MILL MACHINERY
Garlock-Walker Machinery Co., Toronto.

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Canada Machinery Corp., Galt, Ont.
Oliver Machy. Co., Grand Rapids, Mich.
Fox Machine Co., Jackson, Mich.
Garlock-Walker Machinery Co., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PATTERN MAKERS' LATHES
See Lathes.

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Marion & Marion, Montreal.
Ridout & Maybee, Toronto.
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Wilson & Co., J. C., Belleville, Ont.
Greenleafs, Ltd., Belleville, Ont.
Marten Machine Co., Hamilton, Ont.

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Steel Co. of Canada, Ltd., Hamilton, Ont.

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PINS, BELT-LACING
Clipper Belt Lacer Co., Grand Rapids.

PHYSICIAN'S SUPPLIES
J. F. Hartz Co., Ltd., Toronto.

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International Malleable Iron Co., Guelph.

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Curtis & Curtis Co., Bridgeport, Conn.
Eo Machine Co Jackson, Mich
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Greenfield Tap & Die Corp., Greenfield.
Hall & Sons, John H., Brantford.
Jardine & Co., A. B., Hespeler, Ont.
Landis Machine Co., Waynesboro, Pa.
McDougall Co., R., Galt.
Wells Bros. Co. of Canada, Galt, Ont.
Williams Tool Co., Erie, Pa.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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PIERCING
Oliver Machy. Co., Grand Rapids, Mich.

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Curtis & Curtis Co., Bridgeport, Conn.
Greenfield Tap & Die Corp., Greenfield.
Hall & Sons, Ltd., John H., Brantford.
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Wells Bros. of Canada, Galt, Ont.

PIPE CUTTERS AND REAMERS
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE STOCKS AND THREADERS
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE TAPS AND VISES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PIPE WRENCHES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.

PISTON RODS, ROUGH TURNED
General Steel Co., Milwaukee, Wis.

PISTON AND PISTON RING MACHINES
National Acme Co., Windsor, Vt.

PLANER BOLTS
Morrow Screw & Nut Co., J., Ingersoll, Ont

PLANER JACKS
Armstrong Bros. Tool Co., Chicago.

PLANERS, STANDARD AND ROTARY
Betts Machine Co., Rochester, N.Y.
Bertram & Sons Co., John, Dundas.
Oliver Machy. Co., Grand Rapids, Mich.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Gardner & Son, Robt., Montreal.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Morton Mfg. Co., Muskegon Heights, Mich
Niles-Bement-Pond Co., New York.
Rudel-Belnap Mach. Co., Montreal, Que.
Whitcomb-Blaisdell Mach. Tool Co., Worcester, Mass.
Williams & Wilson, Ltd., Montreal, Que.

PLANING AND SHAPING MACHINERY
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Foss Mchy. & S'ply Co., G. F., Montreal.
Garlock-Walker Machinery Co., Toronto.
Garvin Machine Co., New York.
Niles-Bement-Pond Co., New York.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

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Lynd-Farquhar Co., Boston.
Williams & Wilson, Ltd., Montreal, Que.

POWER HAMMERS
Quickwork Co., St. Marys, Ohio.

PLANING MILL EXHAUSTERS
Can. Blower & Forge Co., Kitchener, Ont
Sheldons, Ltd., Galt, Ont.
MacGovern & Co., Montreal, Que.
Niles-Bement-Pond Co., New York.

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Aikenhead Hardware Co., Toronto.
Can. Billings & Spencer, Ltd., Welland.
Peck, Stow & Wilcox Co., Southington, Ct.
Rice Lewis & Son, Toronto, Ont.

PNEUMATIC TOOLS
Can. Ingersoll Rand Co., Montreal, Que.
Cleveland P'matic Tool Co., Can., Toronto.
Curtis Pneumatic Machy. Co., St. Louis.
Garlock-Walker Machy. Co., Toronto.
Int. Mach. & Supply Co., Ltd., Montreal.
Independent Pneumatic Tool Co., Chicago.

POWER CRANES, HAND
MacKinnon Steel Co., Sherbrooke, Que.

POLISHING MACHINES
Ford-Smith Machine Co., Hamilton, Ont.
Williams & Wilson, Ltd., Montreal, Que.

POLISHING PLATES
Greenfield Tap & Die Corp., Greenfield.
Wells Bros. of Canada, Galt, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Morris Crane & Hoist Co., Ltd., Herbert, Niagara Falls, Ont.

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Bond Engineering Works, Toronto, Ont.
Williams & Wilson, Ltd., Montreal, Que.

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Metalwood Mfg. Co., Detroit, Mich.
Williams & Wilson, Ltd., Montreal, Que.

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Diss Co., E. W., Brooklyn, N.Y.
Metalwood Mfg. Co., Detroit, Mich
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

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Bliss Co., E. W., Brooklyn, N.Y.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, FILTER
Perrin, Ltd., William R., Toronto.
Smalley-General Co., Inc., Bay City, Mich.

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Metalwood Mfg. Co., Detroit, Mich.
Toledo Machine & Tool Co., Toledo.

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Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co, Toledo.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, HYDRAULIC
Bertram & Sons Co., John, Dundas.
Metalwood Mfg. Co., Detroit, Mich.
Niles-Bement-Pond Co., New York.
Perrin, Ltd., William R., Toronto.
Toledo Machine & Tool Co., Toledo.
Stoll Co., Inc., D. H., Buffalo, N.Y.
Standard Machy. & Supplies, Montreal.
West Tire Setter Co., Rochester, N.Y.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, BALING
Perrin, Ltd., William R., Toronto.

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Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs Co., Ltd., Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Can. Fairbanks-Morse Co., Montreal.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto.
Perrin, Ltd., William R., Toronto.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo.
Williams Machy. Co., A. R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SPRING FOOT
Bliss Co., E. W., Brooklyn, N.Y.
Brown, Boggs & Co., Hamilton, Ont.
Consolidated Press Co., Hastings, Mich.
Toledo Machine & Tool Co., Toledo.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, SCREW
Barnes & Co., W. F. & Jno., Rockford, Ill
Bliss Co., E. W., Brooklyn, N.Y.
Perrin, Ltd., William R., Toronto.
Williams & Wilson, Ltd., Montreal, Que.

PRESSES, TRIMMING
Bliss Co., E. W., Brooklyn, N.Y.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Stoll Co., D. H., Buffalo, N.Y.
Williams & Wilson, Ltd., Montreal, Que.

PROPELLERS
Kennedy & Sons, Wm., Owen Sound.

PSYCROMETERS, SLING
Taylor Instrument Co., Rochester, N.Y.

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Algoma Steel Corp., Sault Ste. Marie, Ont
American Pulley Co., Philadelphia.
Bond Engineering Works, Toronto, Ont.
Baird Machine Co., Bridgeport, Conn.
Bernard Industrial Co., Fortierville, Que.
Brown & Sharpe Mfg. Co., Providence.
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Ford-Smith Machine Co., Hamilton, Ont.
Kennedy & Sons, Ltd., W., Owen Sound.
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Wilson & Co., J. C., Belleville, Ont.
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Baird Machine Co., Bridgeport, Conn.
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Carlyle Johnson Mch. Co., Manchester, Ct.
Positive Clutch & Pulley Works, Toronto.
Jones & Glassco, Montreal.
Williams & Wilson, Ltd., Montreal, Que.

PULP MILL MACHINERY
MacKinnon Steel Co., Sherbrooke, Que.

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Bowser & Co., Inc., S. F., Toronto.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Ingersoll-Rand Co., Montreal, Que.
Darling Bros., Ltd., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Williams & Wilson, Ltd., Montreal, Que.

PUMPS, FUEL OIL
Bowser & Co., Inc., Toronto, Ont.
Darling Bros., Ltd., Montreal, Que.
Trahern Pump Co., Rockford, Ill.

PUMPS, GEARED
Darling Bros., Ltd., Montreal, Que.

PUMPS, HIGH PRESSURE
Perrin, Ltd., William R., Toronto.

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Garlock-Walker Machinery Co., Toronto.
Darling Bros., Ltd., Montreal, Que.
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Williams & Wilson, Ltd., Montreal, Que.

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PUMPS, RUBBER CEMENT
Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, KEROSENE, OIL, SELF-MEASURING
Bowser & Co., Inc., S. F., Fort Wayne.

PUMPS, LUBRICANT, OIL, WATER
Darling Bros., Ltd., Montreal, Que.
Fry's (London), Ltd., London, England.
Trahern Pump Co., Rockford, Ill.

PUMPS, SUD
Fry's (London), Ltd., London, England.

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Graton & Knight Mfg. Co., Worcester.

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Boker & Co., Inc., H, Montreal, Que.
Brown, Boggs Co., Ltd., Hamilton, Can.
Can. Blower & Forge Co., Kitchener, Ont.
Can. Fairbanks-Morse Co., Montreal.
Gardner & Son, Robert, Montreal.
A. B. Jardine & Co., Hespeler, Ont.
Marshall, Son & Blunney, Toronto.
Marten Machine Co., Hamilton, Ont.
Peck, Stow & Wilcox Co., Southington, Ct.
Pilot Steel & Tool Co., Montreal, Que.
Pratt & Whitney Co., Dundas, Ont.
Stoll Co., D. H., Buffalo, N.Y.
Toledo Machine & Tool Co., Toledo, O.
Williams & Wilson, Ltd., Montreal, Que.

PUNCHES, HAND
Peck, Stow & Wilcox Co., Southington, Ct.

PUNCHES, POWER
John Bertram & Sons Co., Dundas, Ont.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co., Ltd, Hamilton, Ont.
Canada Machinery Corp., Galt, Ont.
Consolidated Press Co., Hastings, Mich.
Garlock-Walker Machinery Co., Toronto.
A. B. Jardine & Co., Hespeler, Ont.
Long & Allstatter, Hamilton, Ohio.
Niles-Bement-Pond Co., New York.
D. H. Stoll Co., Buffalo, N.Y.
Wickes & Co, Saginaw, Mich.
Williams & Wilson, Ltd., Montreal, Que.

PUNCHING MACHINES, HORIZONTAL
Bertrams, Ltd., Edinburgh, Scotland.
Bertrams & Sons, John, Dundas, Ont.
Canada Machinery Corp., Galt, Ont.
Wickes & Co., Saginaw, Mich.
E. W. Bliss Co., Brooklyn, N.Y.
Brown, Boggs Co, Ltd., Hamilton, Ont.
Garlock-Walker Mach'y. Co., Toronto.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Ltd., Montreal, Que.

PYROMETERS
Bristol Co., Waterbury, Conn.
Shore Instrument & Mfg. Co., New York.
Taylor Instrument Co., Rochester, N.Y.

QUARTERING MACHINES
Bertram & Sons, John, Dundas, Ont.
Niles-Bement-Pond Co., New York.

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Algoma Steel Corp., Sault Ste. Marie, O.
Niles-Bement-Pond Co., New York.

RADIAL DRILLS
Mueller Machine Tool Co., Cincinnati.

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Garlock-Walker Machinery Co., Toronto.
Niles-Bement-Pond Co., New York.
Williams & Wilson, Ltd., Montreal, Que.

RASPS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Marshall, Son & Bunney, Toronto.
John Morrow Screw & Nut Co., Ingersoll.

RATCHETS
Atkins & Co., Ltd., Wm., Sheffield, Eng.
Keystone Mfg. Co., Buffalo, N.Y.
Marshall, Son & Bunney, Toronto.

RAWHIDE PINIONS (See Gears)

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Cleveland Twist Drill Co., Cleveland.
Greenfield Tap & Die Corp., Greenfield.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
Piewes, Ltd., Winnipeg, Man.
Pratt & Whitney Co., Dundas, Ont.
The Kelly Reamer Co., Cleveland, O.
J. A. M. Taylor, 318 Stair Bldg., Toronto.
Standard Mach. & Supplies, Montreal.
Wells Bros. of Can., Galt, Ont
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Tractor Gears and the Gear Shaper

Refinements in tractor transmissions have been brought about as a necessary development of the tractor as a whole. Alloy steel forged gears have taken the place of steel castings and other inferior materials for high-duty work.

This refinement in good tractors has been carried on all along down the line through the processes of manufacture. There is little advantage to be gained in using high-grade materials for gears unless the gears themselves are accurately cut.

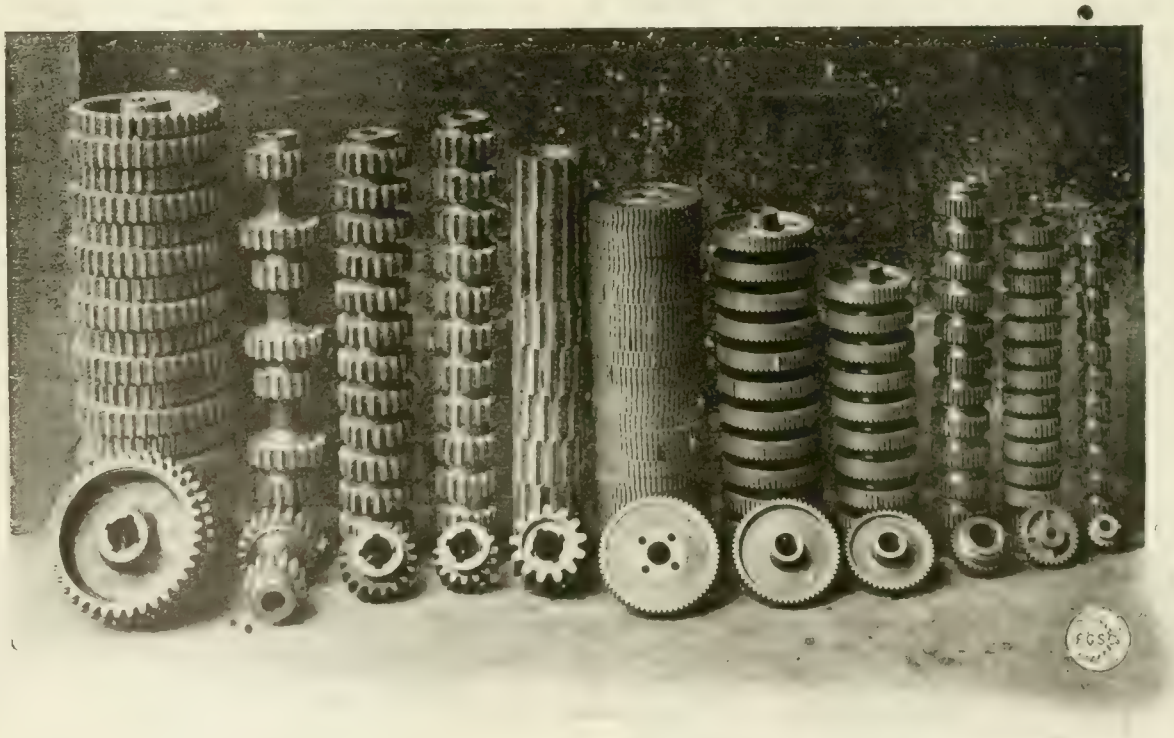
It is for this reason that tractor manufacturers and makers of tractor transmissions are using the Gear Shaper for finishing all of the spur and helical gears entering into the power transmission units of their tractors.

Another reason, which from the cost end is a highly important one, is that tractor gears can be more economically produced on the Gear Shaper than by any other process. Hence, the Gear Shaper combines both accuracy and production.

Among the manufacturers of tractors that are using the Gear Shaper is the Emerson-Brantingham Co., Minneapolis, Minn. We show herewith a collection of gears used in Emerson-Brantingham tractors that are finished on the Gear Shaper.

The Gear Shaper has played no small part in the production of efficient transmissions for automobile and truck use, and is now filling the same position in the tractor field.

Tractor manufacturers desiring assistance in connection with their gear problems are cordially invited to take up such problems with our Engineering Department. This service is given gratis. We will also send a copy of our book "The Internal Gear" to those interested in internal gear design.



Collection of Emerson - Brantingham Tractor Gears Generated on the Fellows Gear Shaper.

The Fellows Gear Shaper Company

Springfield, Vermont, U.S.A.

Foreign Agents: Alfred Herbert, Ltd., Coventry, England; Yokohama, Japan; Calcutta, India; Societe Anonyme, Alfred Herbert, Paris, France, and Spain; Societa Anonima Italiana, Alfred Herbert, Milan, Italy; A. B. Galco, Stockholm, Sweden.

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Gisholt Machine Co., Madison, Wis.
Illinois Tool Works, Chicago, Ill.
Marshall, Son & Bunney, Toronto.
Morrow Screw & Nut Co., J., Ingersoll, Ont
Morse Twist Drill & Mch. Co., New Bedford, Mass.
Pilot Steel & Tool Co., Montreal, Que.
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A. B. Jardine & Co., Hespeler, Ont.
Morse Twist Drill & Mach. Co., New Bedford, Mass.
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Wells Bros. of Canada, Galt, Ont.

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Greenfield Tap & Die Corp., Greenfield.
J. Morrow Screw & Nut Co., Ingersoll, Ont.
Wells Bros. of Can., Galt, Ont.

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Can. Drawn Steel Co., Hamilton.
Pratt & Whitney Co., Dundas.
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Ford-Smith Machine Co., Hamilton, Ont.
Garlock-Walker Machinery Co., Toronto.
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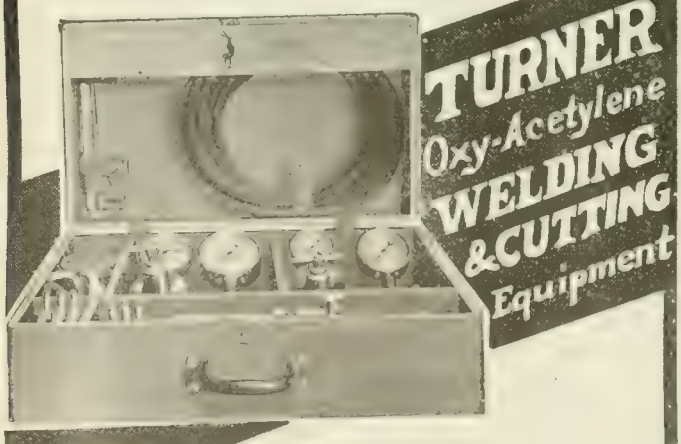

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Norton, Ralph B., Agent, Montreal.
Atkins & Co., Ltd., Wm. Sheffield, Eng
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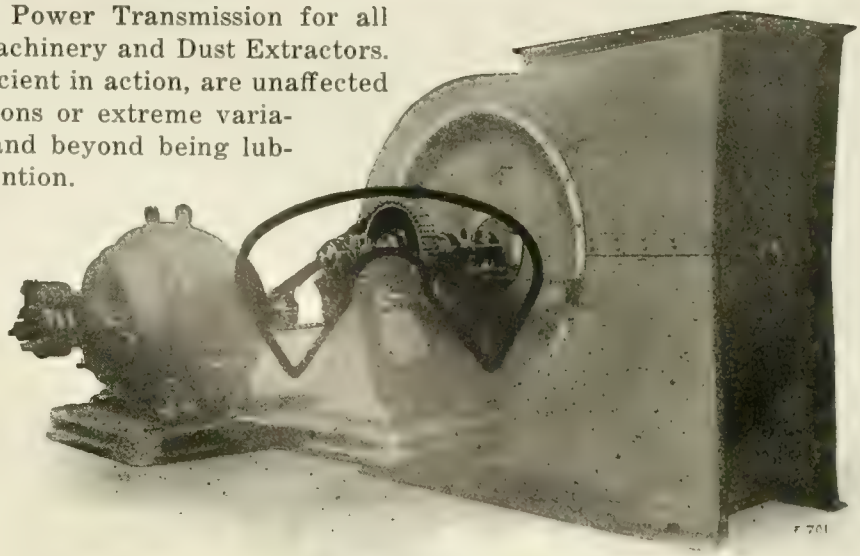

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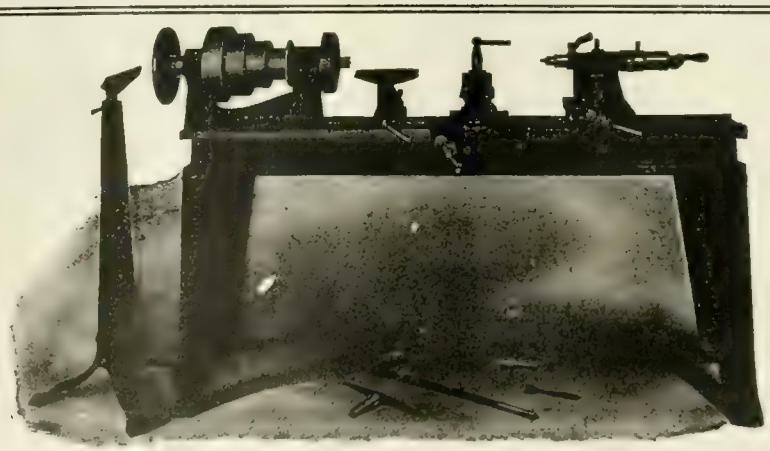

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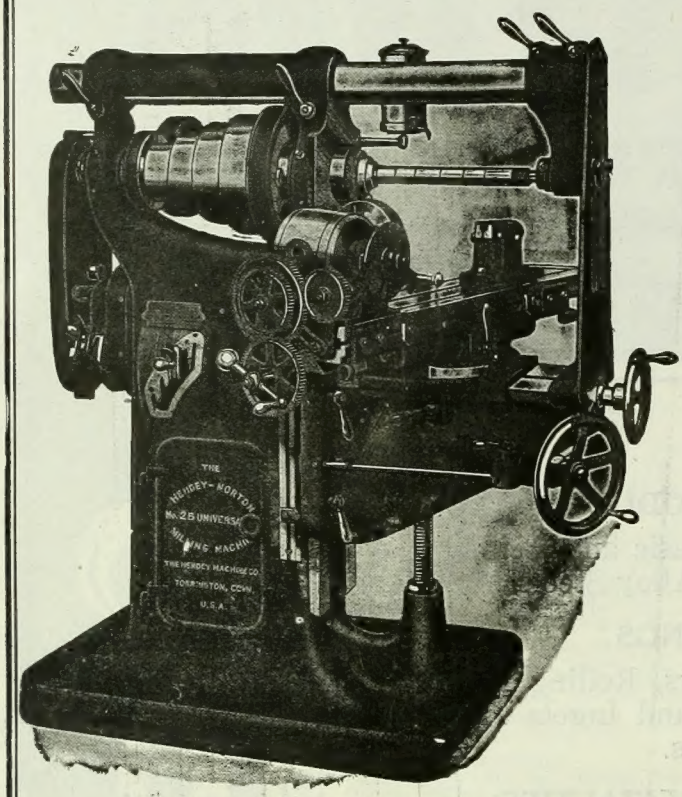

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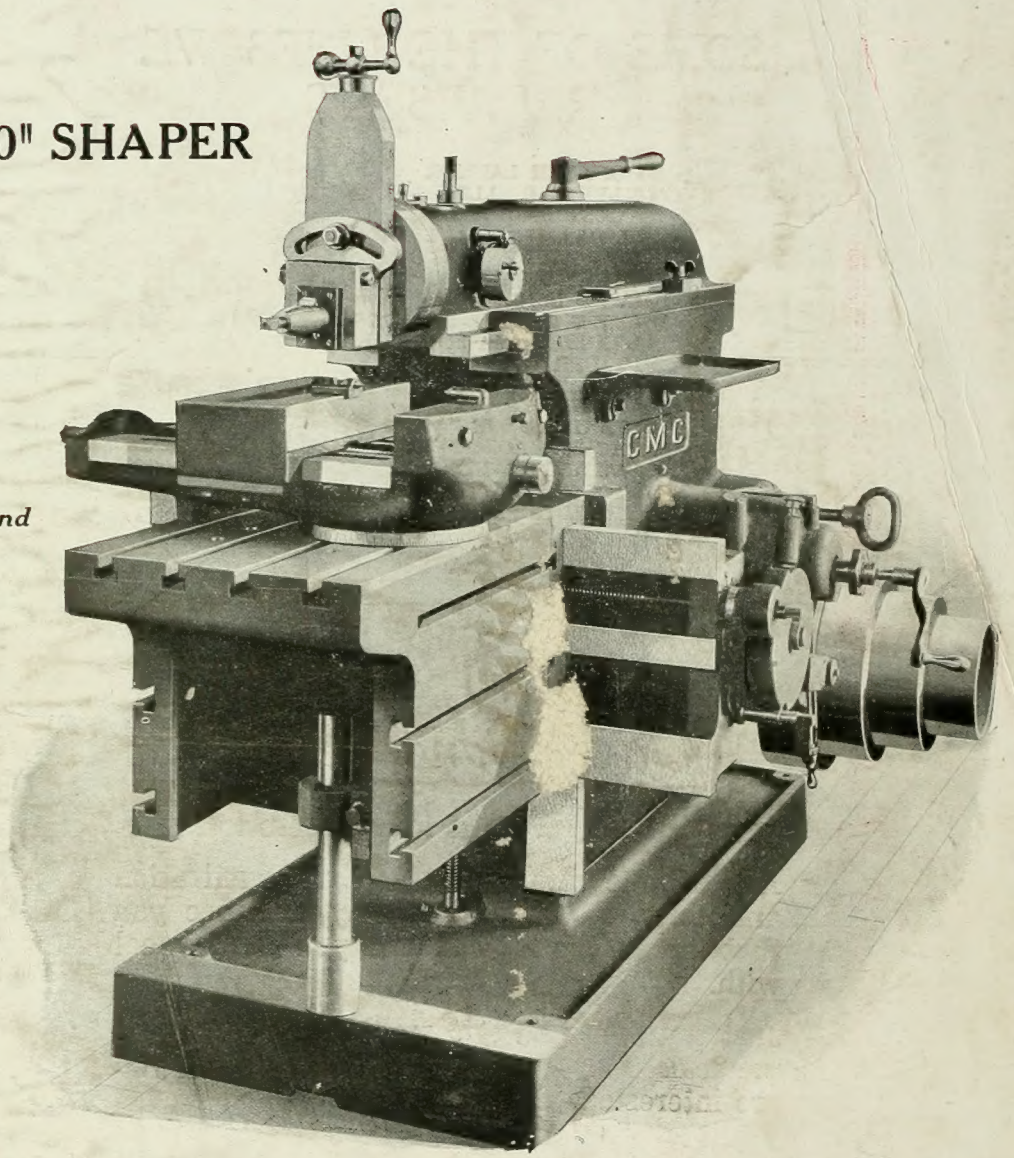

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